
**TECHNICAL MEMORANDUM
SUPPLEMENTAL PHASE 2 REMEDIAL DESIGN FIELD INVESTIGATION
CHEROKEE COUNTY SUPERFUND SITE
BAXTER SPRINGS AND TREECE SUBSITES, OUs 3 AND 4
CHEROKEE COUNTY, KANSAS**

TO: Liz Hagenmaier, EPA Task Order Project Officer
FROM: Chris Robb, HGL Task Order Manager
THROUGH: W. Alan Rittgers, HGL Program Manager
DATE: May 10, 2019
SUBJECT: Technical Memorandum, Supplemental Phase 2 Remedial Design Field Investigation, Cherokee County Operable Units (OU) 3 and 4, Baxter Springs and Treece Subsites
CONTRACT: EP-S7-05-05
TASK ORDER: 0039

1.0 INTRODUCTION

This technical memorandum documents the supplemental data collected by HydroGeoLogic, Inc. (HGL), in support of the second phase of remedial design (RD) of the Baxter Springs and Treece Subsites, Operable Units (OU) 3 and 4 of the Cherokee County Superfund Site located in southeastern Kansas (Figure 1). This work is being executed under U.S. Environmental Protection Agency (EPA) Region 7 Contract EP-S7-05-05, Task Order 0039 and Supplement No. 3 to the Sitewide Sampling and Analysis Plan (SAP) (HGL, 2018). The supplemental data is to be used to delineate current conditions and determine the work remaining after partial completion of the Phase 2 Remedial Action (RA) completed by EPA RA contractors.

Selection of areas for investigation were based on information provided by EPA and on earlier field reconnaissance. Based on this information, a tentative determination was made for areas where previous RAs may have occurred but where supporting data to confirm completion of remediation was lacking, and areas where no remediation had yet been performed.

The investigation work performed and described in this memorandum focused on areas where previous RAs had been performed, but supporting data, such as confirmation sampling results, were not available. The areas included in the supplemental Phase 2 RD field investigation are shown on Figure 1 and consist of:

- The former Sunflower Mine complex, Areas 6, 7, and 8, located southwest of Baxter Springs between Ballard Avenue and Swalley Avenue. Soil samples were collected to determine the magnitude and extent of metals contamination to delineate areas still requiring remediation.
- Five distal sites, each about one acre in size. Samples were collected to characterize the nature and extent of mining wastes at each distal site. Figure 1 also shows the location of an additional five distal sites that were not investigated because either the EPA

determined that no mine wastes were present, or access was not granted to investigate the site.

- The Hessee and Lewis property, located just west of Baxter Springs and south of 19th Street. The area was surveyed and soil pH in specific locations was field screened to supplement similar data previously collected by the Kansas Department of Health and Environment (KDHE), to identify areas where poor quality backfill material with low pH is detrimental to vegetation growth.

Field activities were conducted during two separate mobilizations to collect the required soil samples: December 10 through 20, 2018 and March 4 through 6, 2019. A handheld GPS unit was used to document the x, y coordinates of the test pit and soil sample locations. Sample collection was in accordance with the approved SAP and each sample was assigned a unique sample identification (ID) number based on the location and depth (if applicable) of the sample collection point. Each sample number was cross-referenced to the ID numbers assigned by the EPA Region 7 laboratory, and this information was recorded on the sample collection field sheets and the project logbook. Sample collection field sheets and project logbook pages are included as Attachment 3.

In addition to sample collection, the Hessee and Lewis property (approximately 28 acres) and each of the five distal sites investigated were surveyed to generate current topographic maps for RD. The current topographic map of the Hessee and Lewis property will be compared to the as-built topographic map to identify obvious areas of cover erosion and to serve as a baseline for post-construction topographic contours. The surveys were completed in April 2019; however, the survey data is not included with this report, but will be included in the design documents.

2.0 SUNFLOWER MINE COMPLEX

To delineate areas still requiring remediation at the Sunflower Mine complex site, soil samples were collected and submitted to EPA Region 7 Laboratory for analysis of total cadmium, lead, and zinc (Analytical Method - Metals in Solids by ICP-AES). Grab samples were collected from the 0 to 6-inch interval using disposable hand tools, homogenized in disposable plastic bags, and placed in 8-ounce glass jars. Samples were collected at a frequency of four samples per acre during the period December 10 through 20, 2018. A total of 689 samples were collected, as follows:

	Samples	Field Duplicates	Total Samples
Area 6	69	7	76
Area 7	8	2	10
Area 8	548	55	603
Total	625	64	689

SAP Supplement No. 3 originally estimated 700 samples for Area 8; however, the sampling area was reduced because the northern portion of Area 8 had been remediated during the Phase 1 RA. Also, samples were not collected at 35 locations due to relatively deep standing water in the north and central portions of Area 8. The extreme southeast portion of Area 8 and the west central and eastern portions of Area 6 were intentionally not included in the sampling, as there was no evidence of previous remedial activity in these areas (see Figures 2, 3, and 4).

The analytical results are presented in Table 1 and are summarized below. Metals concentrations were compared to Remedial Action Objectives (RAOs) specified in the September 2006 Record of Decision Amendment for OU3 and OU4 (EPA, 2006). For comparison purposes, the lowest of the RAOs for protection of human health and ecological receptors were used. Figures 2, 3, and 4 illustrate the analytical results and distribution of contamination. The analytical data packages are included in Attachment 4.

	RAO	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	No. of Locations Exceeding RAO
Area 6 (69 sample locations)				
Cadmium	10	0.63	168	56
Lead	400	18	3,220	44
Zinc	1,076	68.8	25,500	56
Area 7 (8 sample locations)				
Cadmium	10	0.92	18.7	1
Lead	400	28.4	707	1
Zinc	1,076	115	2,900	1
Area 8 (548 sample locations)				
Cadmium	10	nondetect	397	213
Lead	400	6.1	14,000	70
Zinc	1,076	nondetect	61,100	251

Notes:

mg/kg = milligram per kilogram

RAO = Remedial Action Objective

3.0 DISTAL SITES

The objective of the soil sampling at the five distal sites was to characterize the nature and extent of mining wastes for RD and to obtain data to allow estimates of mine waste volume to be calculated. A site walk at the distal sites was completed with EPA on March 4, 2019. Based on input from the property owner, at DS-7 and DS-8, it was determined that heavy equipment could not be used and that samples would be collected using a shovel.

On March 6, a backhoe was used to excavate the soil in 1-foot lifts at DS-6, DS-9, and DS-10, and grab samples were collected using disposable hand tools from the backhoe bucket. At DS-7 and DS-8, samples were collected using a shovel. The samples were homogenized in disposable plastic bags and placed in 8-ounce glass jars for submittal to EPA Region 7 Laboratory for analysis of total cadmium, lead, and zinc (Analytical Method - metals in Solids by ICP-AES). A total of 29 samples were collected on March 6, 2019, as follows:

	No. of Test Pits	No. of Samples	Field Duplicates	Total Samples
DS-6	3	6	2	8
DS-7	3	4	0	4
DS-8	3	5	1	6
DS-9	4	4	0	4
DS-10	3	6	1	7
Total	16	25	4	29

The analytical results are presented in Table 2 and summarized below. The sample locations and results are illustrated on Figures 5, 6, and 7.

	RAO	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	No. of samples Exceeding RAO
DS-6 (8 samples)				
Cadmium	10	nondetect	93.8	5
Lead	400	21.9	493	1
Zinc	1,076	84.3	19,400	5
DS-7 (4 samples)				
Cadmium	10	2.8	91.5	2
Lead	400	19.9	441	1
Zinc	1,076	460	19,800	3
DS-8 (6 samples)				
Cadmium	10	7.5	18.6	2
Lead	400	106	335	0
Zinc	1,076	1,470	2,710	6
DS-9 (4 samples)				
Cadmium	10	1.3	7.9	0
Lead	400	23.2	1,710	0
Zinc	1,076	215	81,700	1
DS-10 (7 samples)				
Cadmium	10	2.4	609	5
Lead	400	33.8	45,200	4
Zinc	1,076	429	81,700	6

Notes:

mg/kg = milligrams per kilogram

RAO = Remedial Action Objective

During sample collection at DS-7, it was noted that mining wastes extended outside the expected investigation area. Gravel/chat was found along what appeared to be an old rail line just south of the chat pile. Possible waste remnants extend into the pond to the west, which appears to be excavated around the old rail line. These elements will be noted and shown on the design drawings.

4.0 HESSEE AND LEWIS PROPERTY

This property is the site of former mine waste areas that were remediated during the Phase 1 remedial action in 2009 and 2010. The remedial action included consolidation of mine waste on the property, followed by covering the consolidation area with an 18-inch thick soil cover. The consolidation cover was then vegetated. Due to development of areas where vegetation had failed and erosional areas had subsequently developed, KDHE investigated the Hessee and Lewis property in both 2016 and 2017. During these investigations it was determined that cover material containing acid-forming material and high soil acid concentrations were creating toxic soil conditions that subsequently caused cover vegetation to fail and erosional areas to develop. The 2017 KDHE investigation included the collection of soil samples to determine the cover soil characteristics, including pH of the cover material. KDHE collected a total of 128 samples

ranging in depth from 0 inches below ground surface (bgs) to 52 inches bgs (KDHE, 2018). The pH of the cover material ranged from 1.91 standard units (su) to 6.63 su.

For the 2019 investigation, HGL selected sample locations at the property to supplement the KDHE data. Grab samples were collected using disposable hand tools and homogenized in a disposable pan. Samples were collected from 2 depth intervals at each sample location: 0 to 6 inches bgs and 6 to 18 bgs. A total of 58 soil samples (locations HL-41 through HL-69) were collected from 29 locations. The samples were field screened for pH using an Apera Instruments pH meter and following analytical method EPA-600/2-78-054.

The results of the field screening for pH are presented in Table 3 and illustrated on Figures 8 and 9. Figure 8 shows the pH for the upper sample interval, 0 to 6 inches bgs. Figure 9 shows the pH for the lower sample interval, 6 to 18 inches bgs. The table and figures include both the data collected by KDHE in 2017 (sample locations HL-1 through HL-40) and the current data (sample locations HL-41 through HL-69).

5.0 SUMMARY

Data presented in this technical memorandum will subsequently be used to develop aerial coverage requirements and mine waste volume estimates that will inform the RD documents to be prepared, including a basis of design report, technical specifications, and design drawings.

6.0 REFERENCES

HydroGeoLogic, Inc. (HGL), 2018. Supplement No. 3 Sitewide Sampling and Analysis Plan for Remedial Design, Cherokee County Superfund Site, Operable Units 3 and 4, Baxter Springs & Treece Subsites, Cherokee County, Kansas. October.

Kansas Department of Health and Environment (KDHE), 2018. Expanded Field Investigation OU 03 Baxter springs, Hessee and Lewis Site 2017 Field Investigation and Recommendations. February.

U.S. Environmental Protection Agency (EPA), 2006. Record of Decision Amendment, Cherokee County Superfund Site, Baxter Springs and Treece Subsites, Operable Units #03 and #04, Cherokee County, Kansas. September.

ATTACHMENTS: Attachment 1 Tables
 Attachment 2 Figures
 Attachment 3 Field Documentation
 Attachment 4 Analytical Data

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ATTACHMENT 1

TABLES

- Table 1 Sunflower Mine Complex Soil Sampling Results
- Table 2 Distal Sites Soil Sampling Results
- Table 3 Hessee and Lewis Property Soil pH Results

Table 1
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 6								
8096-79	A6-1	1458594.93417	2402785.41051	12/12/2018	13:46	45.6	1,860	9,440
8096-49	A6-2	1458594.93417	2402885.41051	12/12/2018	13:48	45.2	1,960	9,830
8096-151	A6-3	1458594.93417	2402985.41051	12/12/2018	13:50	54.0	2,560	14,200
8096-48	A6-4	1458594.93417	2403085.41051	12/12/2018	13:52	56.3	2,150	14,100
8096-109	A6-5	1458594.93417	2403185.41051	12/12/2018	13:54	16.6	1,540	11,100
8096-30	A6-6	1458694.93417	2402685.41051	12/12/2018	13:44	40.6	1,480	10,400
8096-80	A6-7	1458694.93417	2402785.41051	12/12/2018	13:42	53.5	1,720	9,640
8096-75	A6-8	1458694.93417	2402885.41051	12/12/2018	13:40	59.1	1,820	9,650
8096-9	A6-9	1458694.93417	2402985.41051	12/12/2018	13:37	72.8	3,220	12,800
8096-5	A6-10	1458694.93417	2403085.41051	12/12/2018	13:35	33.5	1,210	7,530
8096-20	A6-11	1458694.93417	2403185.41051	12/12/2018	13:32	21.7	692	3,990
8096-2	A6-12	1458694.93417	2403285.41051	12/12/2018	13:30	11.5	122	1,010
8096-6	A6-13	1458794.93417	2402585.41051	12/12/2018	13:11	48.7	2,260	15,200
8096-55	A6-14	1458794.93417	2402685.41051	12/12/2018	13:16	44.2	1,670	10,500
8096-81	A6-15	1458794.93417	2402785.41051	12/12/2018	13:18	33.9	1,170	5,960
8096-107	A6-16	1458794.93417	2402885.41051	12/12/2018	13:20	29.2	862	3,990
8096-108	A6-17	1458794.93417	2402985.41051	12/12/2018	13:22	168	2,800	23,900
8096-8	A6-18	1458794.93417	2403085.41051	12/12/2018	13:24	56.6	1,160	12,700
8096-110	A6-19	1458794.93417	2403185.41051	12/12/2018	13:26	60.1	2,040	12,000
8096-95-FD	A6-20	1458794.93417	2403285.41051	12/12/2018	13:28	52.1	2,120	14,200
8096-95	A6-20	1458794.93417	2403285.41051	12/12/2018	13:28	49.2	1,930	13,300
8096-39	A6-21	1458894.93417	2402585.41051	12/12/2018	13:08	27.7	1,120	4,850
8096-133	A6-22	1458894.93417	2402685.41051	12/12/2018	13:06	44.3	1240	8,940
8096-7	A6-23	1458894.93417	2402785.41051	12/12/2018	13:00	105	2,320	10,400
8096-51	A6-24	1458894.93417	2402885.41051	12/12/2018	12:59	25.0	792	4,070
8096-69	A6-25	1458894.93417	2402985.41051	12/12/2018	12:57	19.9	734	4350
8096-41	A6-26	1458894.93417	2403085.41051	12/12/2018	12:55	56.2	2,210	8,670
8096-53-FD	A6-27	1458894.93417	2403185.41051	12/12/2018	12:52	49.6	1,490	11,000
8096-53	A6-27	1458894.93417	2403185.41051	12/12/2018	12:52	69.0	3,170	25,500
8096-70	A6-28	1458894.93417	2403285.41051	12/12/2018	12:50	95.3	1,250	11,700
8096-61	A6-29	1458994.93417	2402685.41051	12/12/2018	12:36	58.2	2,070	14,000
8096-42	A6-30	1458994.93417	2402785.41051	12/12/2018	12:38	41.2	1,180	5,480
8096-32	A6-31	1458994.93417	2402885.41051	12/12/2018	12:40	60.9	1,180	6,670
8096-35-FD	A6-32	1458994.93417	2402985.41051	12/12/2018	12:42	44.1	1,200	9,850
8096-35	A6-32	1458994.93417	2402985.41051	12/12/2018	12:42	36.9	1,100	9,040
8096-46	A6-33	1458994.93417	2403085.41051	12/12/2018	12:44	59.8	1,750	11,800
8096-67	A6-34	1458994.93417	2403185.41051	12/12/2018	12:46	49.3	1,460	11,300
8096-16	A6-35	1458994.93417	2403285.41051	12/12/2018	12:48	36.3	997	8,540
8096-15	A6-36	1459094.93417	2402685.41051	12/12/2018	12:34	52.0	1,470	9,000
8096-76	A6-37	1459094.93417	2402785.41051	12/12/2018	12:32	51.3	1,340	8,570
8096-34	A6-38	1459094.93417	2402885.41051	12/12/2018	12:31	41.8	1,050	5,510
8096-165	A6-39	1459094.93417	2402985.41051	12/12/2018	12:28	94.2	1,880	15,900
8096-62	A6-40	1459094.93417	2403085.41051	12/12/2018	12:26	43.9	1,310	10,200
8096-33	A6-41	1459094.93417	2403185.41051	12/12/2018	12:24	61.0	1,500	11,800
8096-47	A6-42	1459094.93417	2403285.41051	12/12/2018	12:22	77.1	1,200	9,090
8096-50	A6-43	1459194.93417	2402785.41051	12/12/2018	12:15	56.5	1,410	9,980
8096-37	A6-44	1459194.93417	2402885.41051	12/12/2018	12:17	51.3	1,470	11,700
8096-43	A6-45	1459194.93417	2402985.41051	12/12/2018	12:19	25.7	652	4,410
8096-102	A6-46	1459594.93417	2402385.41051	12/12/2018	14:53	12.3	165	1,630
8096-1	A6-47	1459694.93417	2401885.41051	12/12/2018	15:46	8.8	121	1,180

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 6 (Continued)								
8096-18	A6-48	1459694.93417	2401985.41051	12/12/2018	15:26	16.3	314	2,320
8096-21	A6-49	1459694.93417	2402085.41051	12/12/2018	15:24	0.75	47.1	68.8 J
8096-63	A6-50	1459694.93417	2402185.41051	12/12/2018	15:08	13.7	222	1,870
8096-162	A6-51	1459694.93417	2402285.41051	12/12/2018	15:05	13.8	106	1,600
8096-11	A6-52	1459694.93417	2402385.41051	12/12/2018	14:56	15.5	68.2	3,730
8096-59	A6-53	1459794.93417	2401885.41051	12/12/2018	15:44	1.6	18.0	220
8096-106	A6-54	1459794.93417	2401985.41051	12/12/2018	15:29	0.63	30.1	101
8096-103	A6-55	1459794.93417	2402085.41051	12/12/2018	15:22	4.3	183	523
8096-71	A6-56	1459794.93417	2402185.41051	12/12/2018	15:10	10.4	204	1,520
8096-28	A6-57	1459794.93417	2402285.41051	12/12/2018	15:03	18.6	44.8	2,020
8096-27	A6-58	1459794.93417	2402385.41051	12/12/2018	14:58	7.5	70.0	855
8096-25	A6-59	1459894.93417	2401885.41051	12/12/2018	15:41	4.7	54.3	426
8096-3-FD	A6-60	1459894.93417	2401985.41051	12/12/2018	15:31	1.0	28.3	109
8096-3	A6-60	1459894.93417	2401985.41051	12/12/2018	15:31	1.2	25.7	116
8096-65-FD	A6-61	1459894.93417	2402085.41051	12/12/2018	15:18	13.7	172	2,410
8096-65	A6-61	1459894.93417	2402085.41051	12/12/2018	15:18	6.3	132	921
8096-26	A6-62	1459894.93417	2402185.41051	12/12/2018	15:12	2.1	62.2	276
8096-157	A6-63	1459894.93417	2402285.41051	12/12/2018	15:01	4.1	28.7	455
8096-111	A6-64	1459994.93417	2401885.41051	12/12/2018	15:39	3.9	57.1	510
8096-97	A6-65	1459994.93417	2401985.41051	12/12/2018	15:33	1.4	24.4	115
8096-23-FD	A6-66	1459994.93417	2402085.41051	12/12/2018	15:16	18.4	202	2,690
8096-23	A6-66	1459994.93417	2402085.41051	12/12/2018	15:16	13.8	217	2,110
8096-132	A6-67	1459994.93417	2402185.41051	12/12/2018	15:14	25.4	316	4,120
8096-29	A6-68	1460094.93417	2401885.41051	12/12/2018	15:37	5.0	56.9	436
8096-113-FD	A6-69	1460094.93417	2401985.41051	12/12/2018	15:34	30.3	371	6,150
8096-113	A6-69	1460094.93417	2401985.41051	12/12/2018	15:34	28.0	311	4,530
Area 7								
8096-86	A7-1	1457921.67861	2402752.88287	12/12/2018	14:27	1.0	35.5	126
8096-22	A7-2	1457921.67861	2402902.88287	12/12/2018	14:17	2.0	78.4	294
8096-104-FD	A7-3	1457846.67861	2402752.88287	12/12/2018	14:25	18.7	707	2,900
8096-104	A7-3	1457846.67861	2402752.88287	12/12/2018	14:25	17.1	550	2,750
8099-15	A7-4	1457846.67861	2402827.88287	12/12/2018	14:24	0.92	28.4	115
8096-12-FD	A7-5	1457846.67861	2402902.88287	12/12/2018	14:21	2.4	115	353
8096-12	A7-5	1457846.67861	2402902.88287	12/12/2018	14:21	3.1	133	425
8096-112	A7-6	1457771.67861	2402752.88287	12/12/2018	14:29	1.9	69.5	251
8096-14	A7-7	1457771.67861	2402827.88287	12/12/2018	14:32	1.6	41.5	203
8096-60	A7-8	1457771.67861	2402902.88287	12/12/2018	14:34	1.6	36.4	166
Area 8								
8099-20	A8-1	1456153.46333	2400624.74549	12/19/2018	14:30	41.9	149	9,590
8099-20-FD	A8-1	1456153.46333	2400624.74549	12/19/2018	14:30	17.6	138	5,910
8098-84	A8-2	1456153.46333	2401324.74549	12/20/2018	9:31	5.30	68.8	827
8099-100	A8-3	1456153.46333	2401424.74549	12/20/2018	9:33	71.3	473	14,100
8099-100-FD	A8-3	1456153.46333	2401424.74549	12/20/2018	9:33	15.8	415	7,020
8098-192	A8-4	1456253.46333	2400624.74549	12/19/2018	14:28	7.30	16.8	613
8099-147	A8-5	1456253.46333	2400724.74549	12/19/2018	14:33	7.2	47.1	1,590
8099-64	A8-6	1456253.46333	2400824.74549	12/19/2018	15:36	7.9	24.8	2,930
8098-256	A8-7	1456253.46333	2400924.74549	12/19/2018	15:38	30.9	70.0	3,320
8098-130	A8-8	1456253.46333	2401024.74549	12/20/2018	8:33	6.40	15.2	2,420
8099-97	A8-9	1456253.46333	2401124.74549	12/20/2018	8:34	13.6	17.5	2,390
8098-67	A8-10	1456253.46333	2401224.74549	12/20/2018	9:39	9.40	34.1	1,090

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8098-129	A8-11	1456253.46333	2401324.74549	12/20/2018	9:37	23.5	109	4,410
8099-104	A8-12	1456253.46333	2401424.74549	12/20/2018	9:35	10.5	75.3	2,240
8099-18	A8-13	1456353.46333	2400624.74549	12/19/2018	14:26	8.2	29.7	843
8098-72	A8-14	1456353.46333	2400724.74549	12/19/2018	14:34	2.80	24.9	294
8099-170	A8-15	1456353.46333	2400824.74549	12/19/2018	15:34	11.3	19.1	1,720
8099-170-FD	A8-15	1456353.46333	2400824.74549	12/19/2018	15:34	13.1	34.2	2,110
8099-85	A8-16	1456353.46333	2400924.74549	12/19/2018	15:39	37.6	59.4	2,520
8099-30	A8-17	1456353.46333	2401024.74549	12/20/2018	8:31	9.6	25.3	1,200
8099-30-FD	A8-17	1456353.46333	2401024.74549	12/20/2018	8:31	9.2	26.7	1,200
8099-180	A8-18	1456353.46333	2401124.74549	12/20/2018	8:36	14.1	17.2	2,120
8099-180-FD	A8-18	1456353.46333	2401124.74549	12/20/2018	8:36	14.6	18.4	2,170
8098-118	A8-19	1456353.46333	2401224.74549	12/20/2018	9:41	4.10	20.0	3,540
8099-107	A8-20	1456353.46333	2401324.74549	12/20/2018	9:43	8.1	28.5	2,560
8098-150	A8-21	1456353.46333	2401424.74549	12/20/2018	9:45	5.40	43.7	1,140
8098-227	A8-22	1456453.46333	2399424.74549	12/19/2018	8:28	3.00	62.3	413
8099-117	A8-23	1456453.46333	2399524.74549	12/19/2018	8:31	4.4	70.9	561
8098-229	A8-24	1456453.46333	2399624.74549	12/19/2018	8:34	1.30	33.2	118
8098-125	A8-25	1456453.46333	2399724.74549	12/19/2018	8:36	0.48 U	20.3	29.6 U
8098-59	A8-26	1456453.46333	2399824.74549	12/19/2018	9:33	2.10	32.6	371
8098-242	A8-27	1456453.46333	2399924.74549	12/19/2018	9:35	2.20	30.1	271
8098-215	A8-28	1456453.46333	2400024.74549	12/19/2018	10:36	1.10	29.9	212
8099-168	A8-29	1456453.46333	2400124.74549	12/19/2018	10:38	2.0	58.6	286
8099-153	A8-30	1456453.46333	2400224.74549	12/19/2018	12:12	253	5,240	41,700
8099-149	A8-31	1456453.46333	2400324.74549	12/19/2018	12:15	23.0	56.1	1,380
8098-264	A8-32	1456453.46333	2400624.74549	12/19/2018	14:24	3.70	17.5	393
8098-269	A8-33	1456453.46333	2400724.74549	12/19/2018	14:36	2.40	17.7	713
8098-225	A8-34	1456453.46333	2400824.74549	12/19/2018	15:32	6.30	38.9	933
8099-88	A8-35	1456453.46333	2400924.74549	12/19/2018	15:41	3.9	27.5	805
8099-114	A8-36	1456453.46333	2401024.74549	12/20/2018	8:29	2.3	25.0	863
8098-156	A8-37	1456453.46333	2401124.74549	12/20/2018	8:38	5.10	26.4	1,830
8098-120	A8-38	1456453.46333	2401224.74549	12/20/2018	9:57	2.10	25.2	1,090
8099-16	A8-39	1456453.46333	2401324.74549	12/20/2018	9:52	16.7	80.4	3,170
8098-83	A8-40	1456453.46333	2401424.74549	12/20/2018	9:50	3.00	17.1	522
8099-160	A8-41	1456453.46333	2401524.74549	12/20/2018	9:46	0.42 U	19.2	20.2
8099-160-FD	A8-41	1456453.46333	2401524.74549	12/20/2018	9:46	0.43 U	19.5	21.3
8099-118	A8-42	1456553.46333	2399624.74549	12/19/2018	8:22	5.5	126	892
8098-267	A8-43	1456553.46333	2399724.74549	12/19/2018	8:39	13.9	104	1,190
8099-111	A8-44	1456553.46333	2399824.74549	12/19/2018	9:31	14.8	191	2,140
8099-111-FD	A8-44	1456553.46333	2399824.74549	12/19/2018	9:31	9.5	160	1,500
8098-134	A8-45	1456553.46333	2399924.74549	12/19/2018	9:37	2.10	23.5	687
8098-79	A8-46	1456553.46333	2400024.74549	12/19/2018	10:34	4.50	67.9	727
8098-79-FD	A8-46	1456553.46333	2400024.74549	12/19/2018	10:34	2.20	27.2	399
8099-133	A8-47	1456553.46333	2400124.74549	12/19/2018	10:41	0.62	20.3	146
8098-278	A8-48	1456553.46333	2400224.74549	12/19/2018	12:09	5.50	97.0	800
8099-143	A8-49	1456553.46333	2400324.74549	12/19/2018	12:17	7.5	31.2	1,380
8098-38	A8-50	1456553.46333	2400424.74549	12/19/2018	13:06	45.2	333	6,390
8099-59	A8-51	1456553.46333	2400524.74549	12/19/2018	13:10	5.8	359	1,080
8098-236	A8-52	1456553.46333	2400624.74549	12/19/2018	14:21	5.60	30.7	896
8098-189	A8-53	1456553.46333	2400724.74549	12/19/2018	14:38	3.90	22.4	562
8098-27	A8-54	1456553.46333	2400824.74549	12/19/2018	15:30	3.50	40.4	1,200

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8099-65	A8-55	1456553.46333	2400924.74549	12/19/2018	15:43	10.9	41.8	1,120
8098-99	A8-56	1456553.46333	2401024.74549	12/20/2018	8:26	1.80	20.7	532
8098-136	A8-57	1456553.46333	2401124.74549	12/20/2018	8:40	1.20	21.2	1,450
8099-158	A8-58	1456553.46333	2401224.74549	12/20/2018	10:00	48.0	39.8	3,250
8099-44	A8-59	1456553.46333	2401324.74549	12/20/2018	10:02	8.3	38.9	1,660
8099-184	A8-60	1456553.46333	2401424.74549	12/20/2018	10:04	2.2	15.4	237
8098-245	A8-61	1456653.46333	2399624.74549	12/19/2018	8:19	15.6	1,710	12,700
8098-245-FD	A8-61	1456653.46333	2399624.74549	12/19/2018	8:19	13.8	1,780	16,600
8098-151	A8-62	1456653.46333	2399724.74549	12/19/2018	8:42	42.0	5,070	4,040
8098-137	A8-63	1456653.46333	2399824.74549	12/19/2018	9:29	0.73	19.2	294
8098-249	A8-64	1456653.46333	2399924.74549	12/19/2018	9:39	0.66	31.4	63.30
8099-139	A8-65	1456653.46333	2400024.74549	12/19/2018	10:32	6.7	54.5	1,070
8098-40	A8-66	1456653.46333	2400124.74549	12/19/2018	10:43	0.48	12.5	80.60
8098-207	A8-67	1456653.46333	2400224.74549	12/19/2018	12:07	10.6	81.4	1,270
8098-238	A8-68	1456653.46333	2400324.74549	12/19/2018	12:18	133	81.4	5,760
8098-238-FD	A8-68	1456653.46333	2400324.74549	12/19/2018	12:18	139	72.7	6,560
8099-67	A8-69	1456653.46333	2400424.74549	12/19/2018	13:04	21.7	281	2,670
8098-281	A8-70	1456653.46333	2400524.74549	12/19/2018	13:12	8.60	75.9	1,400
8098-263	A8-71	1456653.46333	2400624.74549	12/19/2018	14:19	10.1	33.4	1,210
8099-108	A8-72	1456653.46333	2400724.74549	12/19/2018	14:40	11.6	29.1	551
8099-144	A8-73	1456653.46333	2400824.74549	12/19/2018	15:28	14.1	33.3	2,470
8098-102	A8-74	1456653.46333	2400924.74549	12/19/2018	15:45	2.60	34.7	328
8099-94	A8-75	1456653.46333	2401024.74549	12/20/2018	8:25	2.4	27.9	689
8099-103	A8-76	1456653.46333	2401124.74549	12/20/2018	8:42	4.3	32.4	1,150
8099-96	A8-77	1456653.46333	2401224.74549	12/20/2018	10:12	15.6	25.5	1,780
8098-61	A8-78	1456653.46333	2401324.74549	12/20/2018	10:10	5.20	19.9	911
8098-160	A8-79	1456653.46333	2401424.74549	12/20/2018	10:08	7.80	29.6	1,120
8098-116	A8-80	1456653.46333	2401524.74549	12/20/2018	10:06	1.60	26.1	325
8098-217	A8-81	1456753.46333	2399624.74549	12/19/2018	8:17	18.6	96.1	1,960
8099-25	A8-82	1456753.46333	2399724.74549	12/19/2018	8:44	67.7	2,370	11,500
8098-226	A8-83	1456753.46333	2399824.74549	12/19/2018	9:26	0.68	25.8	85.7
8098-255	A8-84	1456753.46333	2399924.74549	12/19/2018	9:41	1.60	29.1	534
8098-255-FD	A8-84	1456753.46333	2399924.74549	12/19/2018	9:41	1.30	31.6	380
8098-254	A8-85	1456753.46333	2400024.74549	12/19/2018	10:29	21.2	46.0	3,290
8098-257	A8-86	1456753.46333	2400124.74549	12/19/2018	10:45	3.80	49.8	487
8098-280	A8-87	1456753.46333	2400224.74549	12/19/2018	12:05	11.2	96.1	1,420
8098-77	A8-88	1456753.46333	2400324.74549	12/19/2018	12:20	24.8	209	3,280
8099-148	A8-89	1456753.46333	2400424.74549	12/19/2018	13:02	11.2	138	1,570
8099-125	A8-90	1456753.46333	2400524.74549	12/19/2018	13:14	14.6	135	1,480
8098-131	A8-91	1456753.46333	2400624.74549	12/19/2018	14:17	86.8	572	7,760
8098-272	A8-92	1456753.46333	2400724.74549	12/19/2018	14:42	17.1	70.8	1,550
8098-268	A8-93	1456753.46333	2400824.74549	12/19/2018	15:26	7.10	31.4	614
8099-81	A8-94	1456753.46333	2400924.74549	12/19/2018	15:48	12.4	48.3	1,410
8098-158	A8-95	1456753.46333	2401024.74549	12/20/2018	8:23	0.47 U	15.0	35.0
8098-155	A8-96	1456753.46333	2401124.74549	12/20/2018	8:44	1.60	34.3	481
8098-143	A8-97	1456753.46333	2401224.74549	12/20/2018	10:14	15.2	30.0	2,730
8098-85	A8-98	1456753.46333	2401324.74549	12/20/2018	10:16	7.50	30.6	1,360
8099-98	A8-99	1456753.46333	2401424.74549	12/20/2018	10:18	5.7	37.0	978
8099-116	A8-100	1456753.46333	2401524.74549	12/20/2018	10:21	38.9	334	6,180
8098-10	A8-101	1456853.46333	2399624.74549	12/19/2018	8:15	4.70	45.2	985

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8098-168	A8-102	1456853.46333	2399724.74549	12/19/2018	8:46	5.80	80.8	672
8098-266	A8-103	1456853.46333	2399824.74549	12/19/2018	9:25	0.44 U	47.2	16.40
8099-127	A8-104	1456853.46333	2399924.74549	12/19/2018	9:45	2.5	45.6	851
8098-198	A8-105	1456853.46333	2400024.74549	12/19/2018	10:27	3.40	38.8	1,330
8099-80	A8-106	1456853.46333	2400124.74549	12/19/2018	10:47	25.9	116	4,220
8099-80-FD	A8-106	1456853.46333	2400124.74549	12/19/2018	10:47	24.3	97.5	3,060
8098-88	A8-107	1456853.46333	2400224.74549	12/19/2018	12:03	41.2	239	7,430
8099-146	A8-108	1456853.46333	2400324.74549	12/19/2018	12:22	14.2	119	1,900
8098-157	A8-109	1456853.46333	2400424.74549	12/19/2018	13:00	14.1	31.5	1,520
8098-68	A8-110	1456853.46333	2400524.74549	12/19/2018	13:17	15.2	128	1,960
8099-112	A8-111	1456853.46333	2400624.74549	12/19/2018	14:14	7.3	33.7	633
8098-29	A8-112	1456853.46333	2400724.74549	12/19/2018	14:44	3.30	42.9	431
8098-29-FD	A8-112	1456853.46333	2400724.74549	12/19/2018	14:44	3.20	42.6	442
8098-98	A8-113	1456853.46333	2400824.74549	12/19/2018	15:24	10.0	20.3	692
8098-98-FD	A8-113	1456853.46333	2400824.74549	12/19/2018	15:24	13.0	27.8	1,030
8098-244	A8-114	1456853.46333	2400924.74549	12/19/2018	15:51	5.20	41.3	444
8099-37	A8-115	1456853.46333	2401024.74549	12/20/2018	8:21	0.6	29.8	1,430
8098-185	A8-116	1456853.46333	2401124.74549	12/20/2018	8:46	1.20	29.3	1,680
8098-82	A8-117	1456853.46333	2401224.74549	12/20/2018	10:27	16.6	36.3	2,030
8099-109	A8-118	1456853.46333	2401324.74549	12/20/2018	10:20	15.1	30.3	3,260
8098-144	A8-119	1456853.46333	2401424.74549	12/20/2018	10:24	90.5	509	12,200
8098-261	A8-121	1456953.46333	2399624.74549	12/19/2018	8:13	6.20	33.2	370
8098-251	A8-122	1456953.46333	2399724.74549	12/19/2018	8:48	6.60	40.6	1,290
8098-132	A8-123	1456953.46333	2399824.74549	12/19/2018	9:23	8.70	102	1,250
8098-205	A8-124	1456953.46333	2399924.74549	12/19/2018	9:50	0.44 U	24.3	197
8098-190	A8-125	1456953.46333	2400024.74549	12/19/2018	10:25	1.30	26.5	212
8098-124	A8-126	1456953.46333	2400124.74549	12/19/2018	10:49	0.95	36.5	160
8099-186	A8-127	1456953.46333	2400224.74549	12/19/2018	12:01	1.9	41.6	355
8099-150	A8-128	1456953.46333	2400324.74549	12/19/2018	12:25	116	1,010	17,000
8099-150-FD	A8-128	1456953.46333	2400324.74549	12/19/2018	12:25	69.5	426	9,610
8099-134	A8-129	1456953.46333	2400424.74549	12/19/2018	12:58	324	5,900	61,100
8099-122	A8-130	1456953.46333	2400524.74549	12/19/2018	13:20	11.7	59.6	2,030
8098-122	A8-131	1456953.46333	2400624.74549	12/19/2018	14:12	5.20	20.3	1,030
8098-187	A8-132	1456953.46333	2400724.74549	12/19/2018	14:46	9.60	27.6	1,350
8099-83	A8-133	1456953.46333	2400824.74549	12/19/2018	15:22	17.6	92.8	2,110
8098-273	A8-134	1456953.46333	2400924.74549	12/19/2018	15:53	3.80	39.6	359 J
8098-273-FD	A8-134	1456953.46333	2400924.74549	12/19/2018	15:53	3.80	45.7	483
8099-95	A8-135	1456953.46333	2401024.74549	12/20/2018	8:18	11.3	40.9	1,400
8099-71	A8-137	1456953.46333	2401224.74549	12/20/2018	8:54	58.7	193	3,420
8099-92	A8-138	1456953.46333	2401324.74549	12/20/2018	8:56	63.7	406	10,600
8098-162	A8-139	1456953.46333	2401424.74549	12/20/2018	8:59	38.8	284	4,600
8098-154	A8-140	1457053.46333	2399624.74549	12/19/2018	8:10	4.60	132	571
8098-128	A8-141	1457053.46333	2399724.74549	12/19/2018	8:50	9.30	256	1,610
8099-140	A8-142	1457053.46333	2399824.74549	12/19/2018	9:20	1.0	17.4	389
8099-140-FD	A8-142	1457053.46333	2399824.74549	12/19/2018	9:20	1.1	23.0	459
8099-145	A8-143	1457053.46333	2399924.74549	12/19/2018	9:53	1.3	33.6	321
8098-21	A8-144	1457053.46333	2400024.74549	12/19/2018	10:23	0.89	14.8	154
8098-21-FD	A8-144	1457053.46333	2400024.74549	12/19/2018	10:23	12.2	133	1,920
8098-24	A8-145	1457053.46333	2400124.74549	12/19/2018	10:51	10.3	54.9	1,240
8098-246	A8-146	1457053.46333	2400224.74549	12/19/2018	11:58	29.4	301	3,380

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8099-161	A8-147	1457053.46333	2400324.74549	12/19/2018	12:30	80.6	178	14,400
8098-253	A8-148	1457053.46333	2400424.74549	12/19/2018	12:55	179	2,550	28,800
8098-233	A8-149	1457053.46333	2400524.74549	12/19/2018	13:22	25.4	28.6	2,260
8098-93	A8-150	1457053.46333	2400624.74549	12/19/2018	14:10	12.5	59.5	2,220
8098-42	A8-151	1457053.46333	2400724.74549	12/19/2018	14:48	16.8	113	1,340
8098-258	A8-152	1457053.46333	2400824.74549	12/19/2018	15:19	17.0	169	1,990
8099-188	A8-153	1457053.46333	2400924.74549	12/19/2018	15:56	5.8	33.2	525
8099-188-FD	A8-153	1457053.46333	2400924.74549	12/19/2018	15:56	6.0	26.1	491
8099-99	A8-154	1457053.46333	2401024.74549	12/20/2018	8:15	9.0	33.8	807
8098-133	A8-156	1457053.46333	2401224.74549	12/20/2018	9:06	32.7	250	5,650
8099-113	A8-157	1457053.46333	2401324.74549	12/20/2018	9:03	45.3	469	7,330
8099-13	A8-158	1457053.46333	2401424.74549	12/20/2018	9:02	29.6	806	5,660
8098-87	A8-159	1457153.46333	2399624.74549	12/19/2018	8:06	0.92	29.5	131
8098-250	A8-160	1457153.46333	2399724.74549	12/19/2018	8:52	13.7	2,550	3,230
8098-271	A8-161	1457153.46333	2399824.74549	12/19/2018	9:18	0.53	31.2	324
8098-240	A8-162	1457153.46333	2399924.74549	12/19/2018	9:55	5.00	82.3	786
8098-55	A8-163	1457153.46333	2400024.74549	12/19/2018	10:20	1.80	19.3	713
8098-239	A8-164	1457153.46333	2400124.74549	12/19/2018	10:53	46.0	218	5,280
8098-270	A8-165	1457153.46333	2400224.74549	12/19/2018	11:56	0.48 U	14.0	37.7
8099-42	A8-166	1457153.46333	2400324.74549	12/19/2018	12:32	115	291	18,700
8098-274	A8-167	1457153.46333	2400424.74549	12/19/2018	12:51	1.50	24.1	254
8099-31	A8-168	1457153.46333	2400524.74549	12/19/2018	13:25	10.8	76.7	1,630
8099-87	A8-169	1457153.46333	2400624.74549	12/19/2018	14:00	72.2	264	4,560
8098-279	A8-170	1457153.46333	2400724.74549	12/19/2018	14:50	0.94	18.4	304
8099-105	A8-171	1457153.46333	2400824.74549	12/19/2018	15:16	2.3	44.1	280
8099-123	A8-172	1457153.46333	2400924.74549	12/19/2018	15:59	1.7	59.2	230
8099-159	A8-173	1457153.46333	2401024.74549	12/20/2018	8:13	1.2	46.2	229
8099-102	A8-174	1457153.46333	2401124.74549	12/20/2018	10:43	15.8	42.1	1,620
8098-159	A8-175	1457153.46333	2401224.74549	12/20/2018	9:08	42.7	367	6,590
8098-163	A8-176	1457153.46333	2401324.74549	12/20/2018	9:10	19.6	366	2,840
8098-163-FD	A8-176	1457153.46333	2401324.74549	12/20/2018	9:10	22.6	1,070	2,900
8099-32	A8-177	1457153.46333	2401424.74549	12/20/2018	9:20	29.8	383	2,770
8099-121	A8-178	1457153.46333	2401924.74549	12/17/2018	13:00	36.2	591	7,440
8099-119	A8-179	1457253.46333	2399624.74549	12/19/2018	8:04	0.76	30.9	103
8099-11	A8-180	1457253.46333	2399724.74549	12/19/2018	8:56	7.1	69.6	772
8098-241	A8-181	1457253.46333	2399824.74549	12/19/2018	9:15	6.00	62.5	916
8098-148	A8-182	1457253.46333	2399924.74549	12/19/2018	9:57	1.80	11.2	245
8098-248	A8-183	1457253.46333	2400024.74549	12/19/2018	10:17	3.50	19.9	479
8099-155	A8-184	1457253.46333	2400124.74549	12/19/2018	10:56	0.99	28.8	127
8099-60	A8-185	1457253.46333	2400224.74549	12/19/2018	11:54	397	216	55,200
8099-60-FD	A8-185	1457253.46333	2400224.74549	12/19/2018	11:54	267	230	38,700
8099-166	A8-186	1457253.46333	2400324.74549	12/19/2018	12:34	44.5	246	5,950
8098-145	A8-187	1457253.46333	2400424.74549	12/19/2018	12:49	19.4	118	2,840
8098-247	A8-188	1457253.46333	2400524.74549	12/19/2018	13:27	6.90	32.8	406
8099-12	A8-189	1457253.46333	2400624.74549	12/19/2018	13:58	40.0	630	10,500
8099-82	A8-190	1457253.46333	2400724.74549	12/19/2018	14:52	7.2	26.2	798
8099-73	A8-191	1457253.46333	2400824.74549	12/19/2018	15:14	3.0	101	523
8099-68	A8-192	1457253.46333	2400924.74549	12/19/2018	16:01	2.7	56.3	232
8098-161	A8-193	1457253.46333	2401024.74549	12/20/2018	8:11	4.00	70.0	482
8098-117	A8-194	1457253.46333	2401124.74549	12/20/2018	10:40	60.3	534	13,200

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8099-157	A8-195	1457253.46333	2401224.74549	12/18/2018	15:48	10.9	359	2,020
8098-105	A8-196	1457253.46333	2401324.74549	12/18/2018	15:42	4.40	779	999
8098-199	A8-197	1457253.46333	2401424.74549	12/18/2018	15:37	27.5	509	3,220
8098-58	A8-198	1457253.46333	2401524.74549	12/18/2018	15:34	28.7	639	4,850
8098-139	A8-199	1457253.46333	2401624.74549	12/17/2018	14:08	39.0	402	6,500
8098-111	A8-200	1457253.46333	2401724.74549	12/17/2018	14:32	34.6	208	4,900
8098-60	A8-201	1457253.46333	2401824.74549	12/17/2018	12:53	39.5	90.8	5,840
8098-182	A8-202	1457253.46333	2401924.74549	12/17/2018	12:56	4.20	40.4	581
8099-24	A8-203	1457353.46333	2399624.74549	12/19/2018	8:02	0.97	28.0	129
8098-146	A8-204	1457353.46333	2399724.74549	12/19/2018	8:57	2.60	38.6	346
8098-138	A8-205	1457353.46333	2399824.74549	12/19/2018	9:11	3.50	44.1	406
8098-262	A8-206	1457353.46333	2399924.74549	12/19/2018	10:00	25.3	98.9	1,430
8098-259	A8-207	1457353.46333	2400024.74549	12/19/2018	10:14	5.10	11.5	720
8098-147	A8-208	1457353.46333	2400124.74549	12/19/2018	10:58	11.9	190	1,450
8099-66	A8-209	1457353.46333	2400224.74549	12/19/2018	11:52	27.2	106	5,220
8098-237	A8-210	1457353.46333	2400324.74549	12/19/2018	12:36	34.6	215	4,400
8098-252	A8-211	1457353.46333	2400424.74549	12/19/2018	12:46	38.5	141	2,040
8099-187	A8-212	1457353.46333	2400524.74549	12/19/2018	13:30	32.2	213	4,860
8099-89	A8-213	1457353.46333	2400624.74549	12/19/2018	13:56	9.6	109	742
8099-61	A8-214	1457353.46333	2400724.74549	12/19/2018	14:54	12.8	436	1,890
8098-231	A8-215	1457353.46333	2400824.74549	12/19/2018	15:11	15.8	301	2,310
8099-74	A8-216	1457353.46333	2400924.74549	12/19/2018	16:04	2.8	145	389
8099-106	A8-217	1457353.46333	2401024.74549	12/20/2018	8:08	1.5	24.1	284
8099-120	A8-218	1457353.46333	2401124.74549	12/20/2018	10:38	57.9	3,960	41,200
8099-120-FD	A8-218	1457353.46333	2401124.74549	12/20/2018	10:38	55.9	2,660	44,400
8098-180	A8-219	1457353.46333	2401224.74549	12/18/2018	15:50	41.0	1,110	9,850
8098-180-FD	A8-219	1457353.46333	2401224.74549	12/18/2018	15:50	24.9	644	6,150
8098-210	A8-220	1457353.46333	2401324.74549	12/18/2018	15:52	45.1	512	6,330
8098-50	A8-221	1457353.46333	2401424.74549	12/18/2018	15:55	4.90	809	1,210
8098-50-FD	A8-221	1457353.46333	2401424.74549	12/18/2018	15:55	4.30	612	1,000
8098-109	A8-222	1457353.46333	2401524.74549	12/18/2018	15:28	3.30	28.2	3,470
8098-109-FD	A8-222	1457353.46333	2401524.74549	12/18/2018	15:28	3.60	24.6	2,990
8098-196	A8-223	1457353.46333	2401624.74549	12/17/2018	14:05	17.6	465	2,570
8098-222	A8-224	1457353.46333	2401724.74549	12/17/2018	14:35	60.9	1,120	10,000
8098-209	A8-225	1457353.46333	2401824.74549	12/17/2018	12:51	72.3	1,340	13,500
8098-214	A8-226	1457353.46333	2401924.74549	12/17/2018	13:04	14.6	109	3,010
8099-40	A8-228	1457453.46333	2399724.74549	12/19/2018	9:00	1.7	64.8	259
8098-276	A8-229	1457453.46333	2399824.74549	12/19/2018	9:08	2.20	53.3	422
8098-19	A8-230	1457453.46333	2399924.74549	12/19/2018	10:02	29.1	273	4,620
8098-221	A8-231	1457453.46333	2400024.74549	12/19/2018	10:11	0.66	14.0	198
8098-142	A8-232	1457453.46333	2400124.74549	12/19/2018	11:00	2.00	23.9	287
8099-76	A8-233	1457453.46333	2400224.74549	12/19/2018	11:50	37.9	148	4,100
8098-275	A8-234	1457453.46333	2400324.74549	12/19/2018	12:38	0.86	13.9	151
8098-127	A8-235	1457453.46333	2400424.74549	12/19/2018	12:44	1.20	16.1	149
8099-152	A8-236	1457453.46333	2400524.74549	12/19/2018	13:32	1.3	23.6	222
8098-230	A8-237	1457453.46333	2400624.74549	12/19/2018	13:54	42.3	498	3,170
8098-277	A8-238	1457453.46333	2400724.74549	12/19/2018	14:57	21.0	640	3,530
8098-45	A8-239	1457453.46333	2400824.74549	12/19/2018	15:09	2.90	40.0	689
8099-62	A8-240	1457453.46333	2400924.74549	12/19/2018	16:06	17.6	72.0	2,280
8099-101	A8-241	1457453.46333	2401024.74549	12/20/2018	8:03	44.3	686	7,790

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8099-41	A8-242	1457453.46333	2401124.74549	12/20/2018	10:49	100	883	17,600
8099-41-FD	A8-242	1457453.46333	2401124.74549	12/20/2018	10:49	150	1,270	39,800
8098-23	A8-245	1457453.46333	2401424.74549	12/18/2018	16:00	3.10	254	518
8098-228	A8-246	1457453.46333	2401524.74549	12/18/2018	15:24	0.99	30.4	628
8098-152	A8-247	1457453.46333	2401624.74549	12/17/2018	14:02	93.8	763	11,800
8098-152-FD	A8-247	1457453.46333	2401624.74549	12/17/2018	14:02	84.4	733	11,200
8099-93	A8-248	1457453.46333	2401724.74549	12/17/2018	14:37	65.5	894	10,500
8098-188	A8-249	1457453.46333	2401824.74549	12/17/2018	12:49	54.2	497	6,380
8099-77	A8-250	1457453.46333	2401924.74549	12/17/2018	13:07	90.3	561	14,200
8098-119	A8-251	1457553.46333	2400324.74549	12/18/2018	14:40	0.48 U	20.5	74.80
8098-112	A8-252	1457553.46333	2400424.74549	12/18/2018	14:42	1.00	30.0	177
8098-113	A8-253	1457553.46333	2400524.74549	12/18/2018	14:45	28.7	88.3	5,770
8098-26	A8-254	1457553.46333	2400624.74549	12/18/2018	14:47	45.2	473	7,600
8098-49	A8-261	1457553.46333	2401524.74549	12/18/2018	15:18	51.0	374	12,900
8098-44	A8-262	1457553.46333	2401624.74549	12/17/2018	14:00	71.0	1,290	11,300
8099-72	A8-263	1457553.46333	2401724.74549	12/17/2018	14:39	44.2	412	6,230
8098-176	A8-264	1457553.46333	2401824.74549	12/17/2018	12:45	46.6	628	7,090
8098-70	A8-265	1457553.46333	2401924.74549	12/17/2018	13:08	121	1,190	36,500
8098-70-FD	A8-265	1457553.46333	2401924.74549	12/17/2018	13:08	142	1,520	39,600
8098-90	A8-266	1457653.46333	2400224.74549	12/18/2018	14:37	6.10	17.4	848
8098-73	A8-267	1457653.46333	2400324.74549	12/18/2018	14:34	176	14,000	27,600
8098-96	A8-268	1457653.46333	2400424.74549	12/18/2018	14:32	27.9	329	4,580
8099-142	A8-269	1457653.46333	2400524.74549	12/18/2018	14:30	38.4	370	8,870
8099-136	A8-270	1457653.46333	2400624.74549	12/18/2018	14:28	14.9	179	1,690
8098-75	A8-271	1457653.46333	2400724.74549	12/18/2018	14:26	62.1	1,250	14,500
8098-243	A8-276	1457653.46333	2401424.74549	12/18/2018	15:04	36.3	993	3,620
8098-92	A8-277	1457653.46333	2401524.74549	12/18/2018	15:06	39.7	431	6,410
8098-174	A8-278	1457653.46333	2401624.74549	12/17/2018	13:57	45.2	518	7,310
8098-123	A8-279	1457653.46333	2401724.74549	12/17/2018	14:42	19.1	234	2,110
8098-32	A8-280	1457653.46333	2401824.74549	12/17/2018	12:42	22.8	26.5	2,290
8098-31	A8-281	1457653.46333	2401924.74549	12/17/2018	13:11	8.00	46.1	1,290
8099-163	A8-282	1457753.46333	2400224.74549	12/18/2018	13:57	0.47 U	17.3	841
8099-173	A8-283	1457753.46333	2400324.74549	12/18/2018	14:00	35.4	185	3,970
8099-156	A8-284	1457753.46333	2400424.74549	12/18/2018	14:02	2.6	40.8	392
8098-265	A8-285	1457753.46333	2400524.74549	12/18/2018	14:05	3.40	28.0	691
8098-265-FD	A8-285	1457753.46333	2400524.74549	12/18/2018	14:05	3.10	15.3	599
8098-184	A8-286	1457753.46333	2400624.74549	12/18/2018	14:07	15.1	168	2,210
8098-115	A8-287	1457753.46333	2400724.74549	12/18/2018	14:09	76.2	3,560	32,800
8098-115-FD	A8-287	1457753.46333	2400724.74549	12/18/2018	14:09	68.9	4,680	39,400
8099-130	A8-288	1457753.46333	2400824.74549	12/18/2018	14:11	199	5,530	49,100
8099-130-FD	A8-288	1457753.46333	2400824.74549	12/18/2018	14:11	207	5,100	51,800
8099-169	A8-289	1457753.46333	2400924.74549	12/18/2018	14:13	46.3	516	13,700
8099-164	A8-290	1457753.46333	2401024.74549	12/17/2018	16:03	53.8	195	7,510
8098-195	A8-295	1457753.46333	2401524.74549	12/18/2018	15:08	18.9	222	3,840
8098-195-FD	A8-295	1457753.46333	2401524.74549	12/18/2018	15:08	21.4	263	4,460
8098-211	A8-296	1457753.46333	2401624.74549	12/17/2018	13:55	31.1	311	5,630
8098-106	A8-297	1457753.46333	2401724.74549	12/17/2018	14:45	13.9	66.5	2,130
8098-25	A8-298	1457753.46333	2401824.74549	12/17/2018	12:40	23.2	123	5,200
8099-75	A8-299	1457753.46333	2401924.74549	12/17/2018	13:13	41.0	317	5,800
8098-39	A8-300	1457853.46333	2400224.74549	12/18/2018	13:54	6.80	93.5	896

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8098-153	A8-301	1457853.46333	2400324.74549	12/18/2018	13:52	11.1	79.7	1,550
8098-183	A8-302	1457853.46333	2400424.74549	12/18/2018	13:50	13.8	104	1,910
8098-260	A8-303	1457853.46333	2400524.74549	12/18/2018	13:47	19.9	576	3,360
8099-78	A8-304	1457853.46333	2400624.74549	12/18/2018	13:45	28.3	423	5,440
8098-114	A8-305	1457853.46333	2400724.74549	12/18/2018	13:43	48.3	239	4,990
8099-131	A8-306	1457853.46333	2400824.74549	12/18/2018	13:40	44.1	424	4,780
8098-181	A8-307	1457853.46333	2400924.74549	12/18/2018	13:38	38.6	15.9	2,680
8098-63	A8-308	1457853.46333	2401024.74549	12/17/2018	15:38	19.6	76.4	3,560
8099-132	A8-314	1457853.46333	2401624.74549	12/17/2018	13:53	14.2	188	2,610
8098-201	A8-315	1457853.46333	2401724.74549	12/17/2018	14:50	6.20	25.4	859
8099-110	A8-316	1457853.46333	2401824.74549	12/17/2018	12:37	12.6	39.6	1,830
8098-101	A8-317	1457853.46333	2401924.74549	12/17/2018	13:15	31.0	197	4,920
8098-86	A8-318	1457953.46333	2400224.74549	12/18/2018	13:16	11.8	76.5	1,370
8098-193	A8-319	1457953.46333	2400324.74549	12/18/2018	13:18	6.60	11.6	807
8098-91	A8-320	1457953.46333	2400424.74549	12/18/2018	13:23	17.6	657	2,450
8098-54	A8-321	1457953.46333	2400524.74549	12/18/2018	13:25	25.1	1,300	4,380
8099-167	A8-322	1457953.46333	2400624.74549	12/18/2018	13:27	3.7	70.2	383
8098-203	A8-323	1457953.46333	2400724.74549	12/18/2018	13:29	36.1	635	8,670
8099-175	A8-324	1457953.46333	2400824.74549	12/18/2018	13:33	22.9	21.8	889
8099-174	A8-325	1457953.46333	2400924.74549	12/18/2018	13:36	95.6	209	8,570
8098-223	A8-326	1457953.46333	2401024.74549	12/17/2018	16:00	30.7	319	4,190
8099-165	A8-327	1457953.46333	2401124.74549	12/17/2018	15:55	11.2	31.9	1,610
8099-171	A8-329	1457953.46333	2401324.74549	12/17/2018	15:45	2.6	27.4	2,400
8098-149	A8-332	1457953.46333	2401624.74549	12/17/2018	13:46	39.1	636	6,460
8098-34	A8-333	1457953.46333	2401724.74549	12/17/2018	14:53	7.50	17.9	1,050
8098-34-FD	A8-333	1457953.46333	2401724.74549	12/17/2018	14:53	6.50	16.8	915
8099-79	A8-334	1457953.46333	2401824.74549	12/17/2018	12:35	17.1	20.8	2,500
8098-76	A8-335	1458053.46333	2400224.74549	12/18/2018	11:50	35.3	1,350	5,070
8098-89	A8-336	1458053.46333	2400324.74549	12/18/2018	11:52	18.4	31.3	1,460
8098-46	A8-337	1458053.46333	2400424.74549	12/18/2018	11:55	1.40	9.10	96.7
8098-80	A8-338	1458053.46333	2400524.74549	12/18/2018	11:58	0.42 U	12.6	72.8
8098-220	A8-339	1458053.46333	2400624.74549	12/18/2018	12:01	9.80	207	1,510
8099-128	A8-340	1458053.46333	2400724.74549	12/18/2018	12:03	16.6	158	2,450
8098-216	A8-341	1458053.46333	2400824.74549	12/18/2018	12:06	5.90	14.6	269
8099-183	A8-342	1458053.46333	2400924.74549	12/18/2018	12:08	4.5	27.5	617
8098-232	A8-343	1458053.46333	2401024.74549	12/18/2018	12:11	6.60	19.4	687
8099-129	A8-344	1458053.46333	2401124.74549	12/18/2018	12:13	17.1	119	1,890
8098-69	A8-345	1458053.46333	2401224.74549	12/17/2018	15:51	20.5	55.9	2,260
8098-135	A8-346	1458053.46333	2401324.74549	12/17/2018	15:42	11.4	16.7	1,300
8098-202	A8-349	1458053.46333	2401624.74549	12/17/2018	13:48	17.7	212	2,610
8098-179	A8-350	1458053.46333	2401724.74549	12/17/2018	14:56	7.30	40.3	1,180
8098-200	A8-351	1458053.46333	2401824.74549	12/17/2018	12:31	5.70	23.8	1,080
8098-219	A8-352	1458153.46333	2400224.74549	12/18/2018	11:47	40.7	132	8,450
8098-219-FD	A8-352	1458153.46333	2400224.74549	12/18/2018	11:47	39.8	123	7,590
8099-154	A8-353	1458153.46333	2400324.74549	12/18/2018	11:45	11.0	136	1,820
8098-64	A8-354	1458153.46333	2400424.74549	12/18/2018	11:42	0.48 U	10.9	34.4 U
8098-175	A8-355	1458153.46333	2400524.74549	12/18/2018	11:40	1.50	27.4	207
8099-84	A8-356	1458153.46333	2400624.74549	12/18/2018	11:36	1.3	11.1	96.0
8099-8	A8-357	1458153.46333	2400724.74549	12/18/2018	11:35	7.6	38.6	1,440
8099-137	A8-358	1458153.46333	2400824.74549	12/18/2018	11:32	3.6	29.9	921

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8098-194	A8-359	1458153.46333	2400924.74549	12/18/2018	11:30	0.44 U	14.3	216
8098-28	A8-360	1458153.46333	2401024.74549	12/18/2018	11:27	2.80	15.2	302
8098-43	A8-361	1458153.46333	2401124.74549	12/18/2018	11:25	5.70	30.2	445
8099-181	A8-362	1458153.46333	2401224.74549	12/18/2018	11:22	5.4	28.8	850
8098-78	A8-363	1458153.46333	2401324.74549	12/18/2018	11:20	8.60	30.5	1,060
8099-179	A8-364	1458153.46333	2401424.74549	12/17/2018	15:34	19.6	37.9	3,340
8098-108	A8-367	1458153.46333	2401724.74549	12/17/2018	12:28	5.40	17.7	1,160
8098-53	A8-369	1458253.46333	2400224.74549	12/18/2018	10:37	1.20	13.8	514
8098-100	A8-370	1458253.46333	2400324.74549	12/18/2018	10:40	0.44 U	13.4	219
8099-91	A8-371	1458253.46333	2400424.74549	12/18/2018	10:42	42.9	809	3,870
8098-94	A8-372	1458253.46333	2400524.74549	12/18/2018	10:45	3.00	37.4	451
8098-33	A8-373	1458253.46333	2400624.74549	12/18/2018	10:48	3.30	27.4	920
8099-178	A8-374	1458253.46333	2400724.74549	12/18/2018	10:50	18.3	245	2,690
8098-74	A8-375	1458253.46333	2400824.74549	12/18/2018	10:53	73.0	335	4,830
8098-224	A8-376	1458253.46333	2400924.74549	12/18/2018	10:55	4.70	44.0	595
8098-186	A8-377	1458253.46333	2401024.74549	12/18/2018	10:58	0.44 U	32.7	115
8098-186-FD	A8-377	1458253.46333	2401024.74549	12/18/2018	10:58	0.42 U	17.7	132
8098-206	A8-378	1458253.46333	2401124.74549	12/18/2018	11:00	1.60	32.8	1,540
8098-140	A8-379	1458253.46333	2401224.74549	12/18/2018	11:03	14.9	22.2	869
8098-140-FD	A8-379	1458253.46333	2401224.74549	12/18/2018	11:03	14.8	20.2	887
8098-177	A8-380	1458253.46333	2401324.74549	12/18/2018	11:04	1.70	29.0	526
8098-103	A8-381	1458253.46333	2401424.74549	12/17/2018	15:31	3.30	23.4	616
8098-173	A8-382	1458253.46333	2401524.74549	12/17/2018	15:29	11.4	48.0	2,800
8098-66	A8-384	1458253.46333	2401724.74549	12/17/2018	12:26	0.44 U	20.7	62.9
8099-151	A8-385	1458253.46333	2401824.74549	12/17/2018	12:19	0.89	30.0	221
8098-218	A8-386	1458353.46333	2400224.74549	12/18/2018	10:22	12.4	386	1,870
8098-212	A8-387	1458353.46333	2400324.74549	12/18/2018	10:20	2.10	28.6	1,540
8098-37	A8-388	1458353.46333	2400424.74549	12/18/2018	10:17	1.60	17.7	213
8098-107	A8-389	1458353.46333	2400524.74549	12/18/2018	10:15	1.50	14.0	236
8098-191	A8-390	1458353.46333	2400624.74549	12/18/2018	10:13	4.20	13.6	640
8098-204	A8-391	1458353.46333	2400724.74549	12/18/2018	10:10	53.9	2,000	16,700
8098-51	A8-392	1458353.46333	2400824.74549	12/18/2018	10:08	34.3	82.6	2,200
8098-234	A8-393	1458353.46333	2400924.74549	12/18/2018	10:05	10.4	27.9	401
8098-95	A8-394	1458353.46333	2401024.74549	12/18/2018	10:03	18.0	145	2,450
8098-213	A8-395	1458353.46333	2401124.74549	12/18/2018	10:01	115	173	13,900
8098-35	A8-396	1458353.46333	2401224.74549	12/18/2018	9:59	7.50	27.4	1,150
8098-104	A8-397	1458353.46333	2401324.74549	12/18/2018	9:56	3.90	15.9	536
8099-182	A8-398	1458353.46333	2401424.74549	12/17/2018	15:21	14.8	64.0	1,480
8099-177	A8-399	1458353.46333	2401524.74549	12/17/2018	15:18	5.7	22.0	580
8099-115	A8-400	1458353.46333	2401624.74549	12/17/2018	13:41	6.1	20.0	509
8098-36	A8-401	1458353.46333	2401724.74549	12/17/2018	12:24	25.9	671	5,250
8099-7	A8-402	1458353.46333	2401824.74549	12/17/2018	12:16	0.55	9.2	88.7
8098-235	A8-403	1458453.46333	2400224.74549	12/18/2018	10:24	0.94	26.3	106
8098-235-FD	A8-403	1458453.46333	2400224.74549	12/18/2018	10:24	1.30	34.8	139
8098-126	A8-404	1458453.46333	2400324.74549	12/18/2019	10:28	1.20	22.7	127
8098-97	A8-405	1458453.46333	2400424.74549	12/18/2018	10:31	50.8	1,500	21,500
8098-197	A8-406	1458453.46333	2400524.74549	12/18/2018	10:34	6.80	94.4	833
8098-110	A8-407	1458453.46333	2401324.74549	12/17/2018	15:07	5.10	75.8	650
8098-56	A8-408	1458453.46333	2401424.74549	12/17/2018	15:13	3.80	70.2	547
8098-71	A8-409	1458453.46333	2401524.74549	12/17/2018	15:11	12.0	52.4	2,810

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8098-208	A8-410	1458453.46333	2401624.74549	12/17/2018	15:16	27.0	284	3,250
8098-208-FD	A8-410	1458453.46333	2401624.74549	12/17/2018	15:16	12.6	105	1,440
8098-30	A8-412	1458453.46333	2401824.74549	12/17/2018	12:05	35.8	461	5,920
8098-52	A8-413	1458553.46333	2401524.74549	12/17/2018	15:25	7.50	49.1	1,030
8098-81	A8-414	1458553.46333	2401624.74549	12/17/2018	12:00	1.10	13.4	229
8099-126	A8-415	1458553.46333	2401724.74549	12/17/2018	11:57	2.2	35.4	340
8096-171	A8-417	1458653.46333	2401524.74549	12/12/2018	10:54	42.0	177	2,230
8096-88-FD	A8-421	1458753.46333	2401524.74549	12/12/2018	10:48	1.1	55.1	128
8096-88	A8-421	1458753.46333	2401524.74549	12/12/2018	10:48	1.2	57.0	114
8096-44-FD	A8-422	1458753.46333	2401624.74549	12/12/2018	10:57	1.2	18.5	15.6
8096-44	A8-422	1458753.46333	2401624.74549	12/12/2018	10:57	1.5	19.5	13.5
8096-17	A8-423	1458753.46333	2401724.74549	12/12/2018	11:00	0.69	19.6	124
8096-74	A8-424	1458753.46333	2401824.74549	12/12/2018	11:02	0.47 U	13.2	101
8096-85	A8-425	1458853.46333	2401524.74549	12/12/2018	10:44	0.79	12.8	149
8096-56	A8-428	1458853.46333	2401824.74549	12/12/2018	11:05	1.4	21.0	242
8096-82	A8-429	1458953.46333	2400524.74549	12/12/2018	10:36	1.6	42.5	236
8096-64	A8-430	1458953.46333	2400624.74549	12/12/2018	10:33	3.9	53.0	449
8096-84	A8-431	1458953.46333	2400724.74549	12/12/2018	10:30	0.62	17.7	123
8096-10	A8-432	1458953.46333	2400824.74549	12/12/2018	10:27	1.8	42.9	243
8096-166	A8-433	1458953.46333	2400924.74549	12/12/2018	10:25	1.0	28.8	203
8096-40	A8-434	1458953.46333	2401024.74549	12/12/2018	10:22	1.8	37.0	284
8096-91	A8-435	1458953.46333	2401124.74549	12/12/2018	10:20	2.5	60.3	445
8096-58	A8-436	1458953.46333	2401224.74549	12/12/2018	10:15	3.8	77.4	678
8096-77-FD	A8-438	1458953.46333	2401424.74549	12/12/2018	10:10	4.5	12.7	716
8096-77	A8-438	1458953.46333	2401424.74549	12/12/2018	10:10	3.4	15.4	732
8096-164	A8-441	1458953.46333	2401724.74549	12/12/2018	10:00	0.51	16.1	186
8096-52	A8-443	1459053.46333	2400524.74549	12/12/2018	8:39	1.7	44.1	237
8099-28	A8-444	1459053.46333	2400624.74549	12/12/2018	8:41	0.48 U	18.1	50.0
8096-90	A8-445	1459053.46333	2400724.74549	12/12/2018	8:44	0.82	23.9	131
8096-83	A8-446	1459053.46333	2400824.74549	12/12/2018	8:47	0.64	19.6	120
8096-160	A8-447	1459053.46333	2400924.74549	12/12/2018	8:50	1.2	35.9	236
8096-128	A8-448	1459053.46333	2401024.74549	12/12/2018	8:52	1.7	26.5	273
8096-130	A8-449	1459053.46333	2401124.74549	12/12/2018	8:55	1.1	16.6	96.1
8096-125-FD	A8-450	1459053.46333	2401224.74549	12/12/2018	8:57	6.0	101	1,180
8096-125	A8-450	1459053.46333	2401224.74549	12/12/2018	8:57	6.3	105	1,090
8096-87	A8-451	1459053.46333	2401324.74549	12/12/2018	9:00	34.1	531	5,790
8096-38	A8-452	1459053.46333	2401424.74549	12/12/2018	9:03	12.7	170	2,260
8099-162	A8-453	1459053.46333	2401524.74549	12/12/2018	9:05	14.5	189	3,250
8096-73	A8-454	1459053.46333	2401624.74549	12/12/2018	9:08	10.7	111	1,680
8099-138	A8-455	1459053.46333	2401724.74549	12/12/2018	9:11	0.58	16.2	245
8096-72	A8-457	1459153.46333	2400524.74549	12/12/2018	8:36	1.1	30.3	158
8096-98	A8-458	1459153.46333	2400624.74549	12/12/2018	8:34	1.1	18.4	180
8096-57	A8-459	1459153.46333	2400724.74549	12/12/2018	8:31	0.70	22.5	87.2
8096-68	A8-460	1459153.46333	2400824.74549	12/12/2018	8:28	1.1	31.5	249
8096-19	A8-461	1459153.46333	2400924.74549	12/12/2018	8:26	0.71	19.8	105
8096-131	A8-462	1459153.46333	2401024.74549	12/12/2018	8:24	2.3	20.7	378
8096-148	A8-463	1459153.46333	2401124.74549	12/12/2018	8:21	7.8	49.5	570
8096-142	A8-464	1459153.46333	2401224.74549	12/12/2018	8:18	21.1	408	4,110
8096-141	A8-465	1459153.46333	2401324.74549	12/12/2018	8:16	16.7	313	2,950
8096-117	A8-466	1459153.46333	2401424.74549	12/11/2018	8:14	30.7	545	6,520

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8096-101	A8-467	1459153.46333	2401524.74549	12/12/2018	8:11	39.4	338	7,790
8096-172	A8-468	1459153.46333	2401624.74549	12/12/2018	8:08	30.7	126	5,220
8096-31	A8-470	1459153.46333	2401824.74549	12/12/2018	8:04	9.9	71.1	948
8099-47	A8-471	1459253.46333	2400524.74549	12/11/2018	15:55	0.46 U	26.6	64.0
8098-22	A8-472	1459253.46333	2400624.74549	12/11/2018	15:51	0.65	20.0	143
8098-16	A8-473	1459253.46333	2400724.74549	12/11/2018	15:49	0.70	22.1	77.5
8099-27	A8-474	1459253.46333	2400824.74549	12/11/2018	15:46	0.79	19.0	133
8099-45	A8-475	1459253.46333	2400924.74549	12/11/2018	15:44	2.4	37.8	287
8099-35	A8-476	1459253.46333	2401024.74549	12/11/2018	15:39	6.4	62.8	665
8099-10	A8-477	1459253.46333	2401124.74549	12/11/2018	15:36	6.4	74.2	631
8099-10-FD	A8-477	1459253.46333	2401124.74549	12/11/2018	15:36	4.2	50.7	482
8098-2	A8-478	1459253.46333	2401224.74549	12/11/2018	15:33	9.80	224	1,260
8098-17	A8-479	1459253.46333	2401324.74549	12/11/2018	15:29	17.6	332	3,370
8099-58	A8-480	1459253.46333	2401424.74549	12/11/2018	15:25	22.4	288	3,980
8099-26	A8-481	1459253.46333	2401524.74549	12/11/2018	15:23	72.3	364	9,820
8098-169	A8-482	1459253.46333	2401624.74549	12/11/2018	15:20	20.0	82.0	2,340
8098-7	A8-483	1459253.46333	2401724.74549	12/11/2018	15:17	1.60	13.5	347
8099-23	A8-484	1459253.46333	2401824.74549	12/11/2018	15:14	2.3	19.6	314
8098-18	A8-485	1459353.46333	2400524.74549	12/11/2018	14:17	0.82	24.2	71.2
8098-3	A8-486	1459353.46333	2400624.74549	12/11/2018	14:20	0.77	22.1	77.8
8098-12	A8-487	1459353.46333	2400724.74549	12/11/2018	14:23	0.49 U	16.3	59.8
8099-43	A8-488	1459353.46333	2400824.74549	12/11/2018	14:26	0.78	23.3	145
8099-34	A8-489	1459353.46333	2400924.74549	12/11/2018	14:28	0.95	27.5	159
8096-147	A8-490	1459353.46333	2401024.74549	12/11/2018	14:33	5.4	133	379
8096-149	A8-491	1459353.46333	2401124.74549	12/11/2018	14:40	3.1	47.7	361
8096-154	A8-492	1459353.46333	2401224.74549	12/11/2018	14:42	13.1	217	1,510
8098-57	A8-493	1459353.46333	2401324.74549	12/11/2018	14:45	12.8	175	2,320
8099-14	A8-494	1459353.46333	2401424.74549	12/11/2018	14:48	21.5	145	3,400
8098-4	A8-495	1459353.46333	2401524.74549	12/11/2018	14:50	9.30	125	1,370
8096-118	A8-496	1459353.46333	2401624.74549	12/11/2018	14:53	17.5	157	3,620
8096-144	A8-497	1459353.46333	2401724.74549	12/11/2018	14:56	33.2	93.8	5,360
8098-9	A8-498	1459353.46333	2401824.74549	12/11/2018	15:00	1.20	21.9	145
8098-6	A8-499	1459453.46333	2400524.74549	12/11/2018	14:13	0.66	25.3	54.4
8099-22	A8-500	1459453.46333	2400624.74549	12/11/2018	14:10	1.3	42.6	193
8099-21	A8-501	1459453.46333	2400724.74549	12/11/2018	14:08	0.6	24.5	140
8098-11	A8-502	1459453.46333	2400824.74549	12/11/2018	14:06	0.71	24.5	73.0
8099-9	A8-503	1459453.46333	2400924.74549	12/11/2018	14:04	0.84	23.5	149
8098-164	A8-504	1459453.46333	2401024.74549	12/11/2018	14:01	0.47 U	20.2	45.9
8099-50	A8-505	1459453.46333	2401124.74549	12/11/2018	13:58	0.48 U	22.9	90.6
8099-50-FD	A8-505	1459453.46333	2401124.74549	12/11/2018	13:58	0.53 U	22.8	96.2
8099-33	A8-506	1459453.46333	2401224.74549	12/11/2018	13:55	0.47 U	18.7	84.0
8098-5	A8-507	1459453.46333	2401324.74549	12/11/2018	13:52	3.20	112	569
8098-47	A8-508	1459453.46333	2401424.74549	12/11/2018	13:49	3.90	21.2	786
8098-47-FD	A8-508	1459453.46333	2401424.74549	12/11/2018	13:49	3.10	48.6	369
8099-4	A8-509	1459453.46333	2401524.74549	12/11/2018	13:45	2.9	59.2	496
8098-1	A8-510	1459453.46333	2401624.74549	12/11/2018	13:39	4.80	167	760
8098-178	A8-511	1459453.46333	2401724.74549	12/11/2018	13:35	3.00	64.0	364
8098-8	A8-512	1459453.46333	2401824.74549	12/11/2018	13:32	26.7	389	4,170
8098-172	A8-513	1459553.46333	2400524.74549	12/11/2018	12:37	0.46 U	18.7	22.5
8099-46	A8-514	1459553.46333	2400624.74549	12/11/2018	12:40	0.93	31.0	161

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8099-55	A8-515	1459553.46333	2400724.74549	12/11/2018	12:43	0.83	27.7	111
8099-124	A8-516	1459553.46333	2400824.74549	12/11/2018	12:45	1.4	24.6	195
8098-62	A8-517	1459553.46333	2400924.74549	12/11/2018	12:48	0.92	20.8	186
8099-38	A8-518	1459553.46333	2401024.74549	12/11/2018	12:50	0.91	25.8	163 J
8098-170	A8-519	1459553.46333	2401124.74549	12/11/2018	12:53	0.47	18.7	59.5
8098-170-FD	A8-519	1459553.46333	2401124.74549	12/11/2018	12:53	0.49	18.1	65.8
8099-36	A8-520	1459553.46333	2401224.74549	12/11/2018	13:08	1.8	59.1	256
8099-29	A8-521	1459553.46333	2401324.74549	12/11/2018	13:12	0.50 U	24.0	75.0
8099-48	A8-522	1459553.46333	2401424.74549	12/11/2018	13:14	1.1	28.6	247
8099-17	A8-523	1459553.46333	2401524.74549	12/11/2018	13:18	1.1	25.1	189
8099-63	A8-524	1459553.46333	2401624.74549	12/11/2018	13:20	0.49	23.7	70.0
8096-169	A8-525	1459553.46333	2401724.74549	12/11/2018	13:23	0.43 U	8.8	18.4
8099-39	A8-526	1459553.46333	2401824.74549	12/11/2018	13:25	0.43 U	18.2	66.8
8099-3	A8-527	1459653.46333	2400524.74549	12/11/2018	10:30	0.52 U	34.9	37.2
8099-2	A8-528	1459653.46333	2400624.74549	12/11/2018	10:26	0.44 U	18.6	56.7
8099-51	A8-529	1459653.46333	2400724.74549	12/11/2018	10:24	0.48 U	18.3	63.1
8096-123	A8-530	1459653.46333	2400824.74549	12/11/2018	10:21	0.50 U	17.4	38.1
8098-41	A8-531	1459653.46333	2400924.74549	12/11/2018	10:19	0.44 U	14.7	22.5 U
8098-48	A8-532	1459653.46333	2401024.74549	12/11/2018	10:16	0.51	19.8	33.7 U
8098-171	A8-533	1459653.46333	2401124.74549	12/11/2018	12:33	0.45 U	13.9	41.3
8099-141	A8-534	1459653.46333	2401224.74549	12/11/2018	12:30	0.48 U	20.7	97.4
8096-139	A8-535	1459653.46333	2401324.74549	12/11/2018	12:28	0.78	17.2	132
8099-56	A8-536	1459653.46333	2401424.74549	12/11/2018	12:25	0.73	22.7	134 J
8098-166	A8-537	1459653.46333	2401524.74549	12/11/2018	12:23	1.60	65.0	208
8098-13	A8-538	1459653.46333	2401624.74549	12/11/2018	12:20	0.72	18.8	37.4
8098-13-FD	A8-538	1459653.46333	2401624.74549	12/11/2018	12:20	0.69	18.2	45.4
8098-14	A8-539	1459653.46333	2401724.74549	12/11/2018	12:17	0.44	15.1	24.3
8099-57	A8-540	1459653.46333	2401824.74549	12/11/2018	12:14	0.42 U	14.5	17.2
8098-121	A8-541	1459753.46333	2400524.74549	12/11/2018	10:34	0.58	20.7	74.3
8098-121-FD	A8-541	1459753.46333	2400524.74549	12/11/2018	10:34	0.48 U	20.6	44.7 U
8099-185	A8-542	1459753.46333	2400624.74549	12/11/2018	11:14	0.49 U	17.1	49.8
8099-69	A8-543	1459753.46333	2400724.74549	12/11/2018	11:15	0.45 U	22.5	10.7
8096-163	A8-544	1459753.46333	2400824.74549	12/11/2018	11:17	0.51 U	17.0	52.6
8096-121	A8-545	1459753.46333	2401124.74549	12/11/2018	10:11	0.48 U	20.6	77.0 J
8096-94	A8-546	1459753.46333	2401224.74549	12/11/2018	9:57	0.52	18.2	99.5
8096-116	A8-547	1459753.46333	2401324.74549	12/11/2018	9:55	0.47 U	16.5	76.6
8096-167	A8-548	1459753.46333	2401424.74549	12/11/2018	9:52	0.45 U	11.5	41.0
8099-5	A8-549	1459753.46333	2401524.74549	12/11/2018	9:50	0.48 U	17.4	97.2
8096-135-FD	A8-550	1459753.46333	2401624.74549	12/11/2018	9:46	0.40 U	15.7	43.0
8096-135	A8-550	1459753.46333	2401624.74549	12/11/2018	9:46	0.41 U	11.9	42.0
8098-65	A8-551	1459753.46333	2401724.74549	12/11/2018	9:44	0.40 U	11.1	28.6 U
8096-99	A8-552	1459753.46333	2401824.74549	12/11/2018	9:41	21.2	300	3,510
8099-49	A8-553	1459853.46333	2400524.74549	12/11/2018	10:37	1.3	38.1	189
8096-124	A8-554	1459853.46333	2400624.74549	12/11/2018	11:04	1.3	35.0	198
8096-140	A8-555	1459853.46333	2400724.74549	12/11/2018	11:10	0.52 U	19.6	52.3
8096-170	A8-556	1459853.46333	2401324.74549	12/11/2018	9:25	0.51 U	12.4	13.4
8096-168	A8-557	1459853.46333	2401424.74549	12/11/2018	9:27	0.50	18.7	94.7
8099-19	A8-558	1459853.46333	2401524.74549	12/11/2018	9:31	1.8	32.3	538
8099-6	A8-559	1459853.46333	2401624.74549	12/11/2018	9:34	0.41 U	10.4	31.7
8096-93	A8-560	1459853.46333	2401724.74549	12/11/2018	9:36	0.46 U	15.6	51.3

Table 1 (Continued)
Sunflower Mine Complex Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample ID	Location	Northing	Easting	Date	Time	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Area 8 (Continued)								
8099-53	A8-561	1459853.46333	2401824.74549	12/11/2018	9:38	0.42 U	10.1	51.3
8096-137	A8-562	1459953.46333	2400524.74549	12/11/2018	10:40	1.4	33.9	195
8096-145-FD	A8-563	1459953.46333	2400624.74549	12/11/2018	11:01	0.77	29.5	119
8096-145	A8-563	1459953.46333	2400624.74549	12/11/2018	11:01	0.48 U	20.0	57.7
8096-120	A8-564	1459953.46333	2400724.74549	12/11/2018	10:58	0.46 U	15.7	19.6
8096-129	A8-565	1459953.46333	2401424.74549	12/11/2018	9:21	0.59	16.7	54.4
8096-158	A8-566	1459953.46333	2401524.74549	12/11/2018	9:18	0.74	17.2	130
8099-70	A8-567	1459953.46333	2401624.74549	12/11/2018	9:16	0.47 U	6.1	20.9
8099-70-FD	A8-567	1459953.46333	2401624.74549	12/11/2018	9:16	0.45 U	9.5	31.8
8096-100	A8-568	1459953.46333	2401724.74549	12/11/2018	9:13	0.77	18.2	94.8
8096-92	A8-569	1459953.46333	2401824.74549	12/11/2018	9:09	0.52	19.9	64.6
8098-165	A8-570	1460053.46333	2400524.74549	12/11/2018	10:43	0.48	20.1	66.9
8099-176	A8-571	1460053.46333	2400624.74549	12/11/2018	10:52	0.51 U	20.2	78.2
8099-52	A8-572	1460053.46333	2400724.74549	12/11/2018	10:55	0.45 U	16.1	25.7
8096-155-FD	A8-573	1460053.46333	2401424.74549	12/11/2018	8:52	0.45 U	14.0	41.8
8096-155	A8-573	1460053.46333	2401424.74549	12/11/2018	8:52	0.46 U	11.7	24.0
8096-119	A8-574	1460053.46333	2401524.74549	12/11/2018	8:50	1.0	16.8	177
8096-127	A8-575	1460053.46333	2401624.74549	12/11/2018	8:47	2.1	47.9	380
8096-161	A8-576	1460053.46333	2401724.74549	12/11/2018	8:41	2.9	51.3	397
8096-143	A8-577	1460053.46333	2401824.74549	12/11/2018	8:45	0.61	40.7	110
8096-134	A8-578	1460153.46333	2400524.74549	12/11/2018	10:46	0.47 U	17.6	31.9
8098-167	A8-579	1460153.46333	2400624.74549	12/11/2018	10:49	1.90	45.8	214
8096-115	A8-580	1460153.46333	2400724.74549	12/11/2018	8:12	0.48 U	18.9	40.6
8099-54	A8-581	1460153.46333	2400824.74549	12/11/2018	8:14	0.44 U	17.6	57.2
8096-122	A8-582	1460153.46333	2400924.74549	12/11/2018	8:17	0.48 U	21.4	27.7
8098-15	A8-583	1460153.46333	2401024.74549	12/11/2018	8:20	0.51	16.4	22.8
8096-150	A8-584	1460153.46333	2401124.74549	12/11/2018	8:22	2.5	32.1	414
8096-138	A8-585	1460153.46333	2401224.74549	12/11/2018	8:24	0.49 U	20.3	30.0
8096-153	A8-586	1460153.46333	2401324.74549	12/11/2018	8:26	0.51 U	22.1	75.4
8096-152	A8-587	1460153.46333	2401424.74549	12/11/2018	8:29	1.4	49.6	219
8099-1	A8-588	1460153.46333	2401524.74549	12/11/2018	8:32	0.47 U	17.6	62.2 J
8098-141	A8-589	1460153.46333	2401624.74549	12/11/2018	8:35	2.50	21.7	419
8098-141-FD	A8-589	1460153.46333	2401624.74549	12/11/2018	8:35	3.30	32.3	613
8096-159	A8-590	1460153.46333	2401724.74549	12/11/2018	8:38	3.2	47.3	340
8099-172	P1	1457177.43000	2401588.49000	12/17/2018	14:13	33.1	534	6,490
8098-20	P2	1457049.66000	2401715.09000	12/17/2018	14:21	9.90	46.3	1,660
8098-20-FD	P2	1457049.66000	2401715.09000	12/17/2018	14:21	0.44	30.0	48.7 U
8099-86	P3	145706.74000	2401563.40000	12/17/2018	14:18	36.8	700	5,360
8099-90	P4	1457612.03000	2401236.35000	12/18/2018	14:54	29.0	680	3,810
8099-90-FD	P4	1457612.03000	2401236.35000	12/18/2018	14:54	75.3	672	4,610
8099-135	P5	1457575.24000	2401306.62000	12/18/2018	14:59	18.6	554	2,640
						RAOs	10	400
								1,076

Notes:

Locations P1 through P5 were added in areas that were initially thought to be covered by water during sample planning, but were not.

Bolded results indicate a detection.

Shaded results indicate the concentration is greater than the RAO.

FD = field duplicate

mg/kg = milligrams per kilogram

ID = identification

RAO = Remedial Action Objective

J = the reported value is an estimate

U = not detected at the listed method reporting limit

Table 2
Distal Sites Soil Sampling Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Location	Test Pit	Northing (m)	Easting (m)	Sample Interval (inches bgs)	Sample ID	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)	Comments
DS-6	1	445152.43	732871.39	0-8	8162-1	70.1	219	16,000	
				14	8162-2	6.5	31.7	458	
	2	445604.89	732872.25	0-16	8162-3	20.9	376	5,490	
					8162-3-FD	93.8	493	19,400	
	3	445428.63	732893.37	22	8162-5	1.0	22.1	252	
					8162-6	19.7	277	3,810	
				0-19	8162-6-FD	61.7	230	12,600	
				25	8162-8	0.44 U	21.9	84.3	
DS-7	1	447438.74	731122.94	0-10	8162-9	91.5	231	19,800	
					8162-10	2.8	19.9	460	
	2	447471.84	730939.78	0-12	8162-11	56.6 J	441	14,200	
DS-8	1	730570.06	447342.04	0-6	8162-13	7.5	314	1,650	
					8162-14	8.8	176	1,830	
	2	447337.18	730563.41	0-7	8162-15	9.6	172	2,010	
					8162-16	14.1	335	2,480	
	3	447321.91	730539.92	0-6	8162-17	9.3	106	1,470	
					8162-17-FD	18.6	132	2,710	
DS-9	1	445109.00	731281.12	0-24	8162-19	7.9	56.6	1,710	No mining waste encountered
	2	445141.01	731280.28	0-24	8162-20	2.0	28.6	366	No mining waste encountered
	3	445306.08	731272.53	0-24	8162-21	1.8	25.3	334	No mining waste encountered
	4	444971.21	731293.67	0-48	8162-22	1.3	23.2	215	No mining waste encountered
DS-10	1	445097.79	732107.03	0-24	8162-23	2.4	33.8	429	No mining waste encountered
	2	445052.33	732225.85	0-9	8162-24	20.3	40.0	2,180	
				9-17	8162-25	39.2	618	13,700	
					8162-25-FD	20.5	544	9,860	
				23	8162-27	609	45,200	81,700	
	3	444966.92	732247.96	0-16	8162-28	73.2	1,360	11,100	
				22	8162-29	10.9 J	73.3 J	2,420	
RAOs						10.0	400	1,076	

Notes:

Bolded results indicate a detection.

Shaded results indicate the concentration is greater than the RAO.

bgs = below ground surface

FD = field duplicate

ID = identification

J = the reported value is an estimate

m = meter

mg/kg = milligrams per kilogram

RAO = Remedial Action Objective

U = not detected at the listed method reporting limit

Table 3
Hessee and Lewis Property Soil pH Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample Location	Date	Sample Interval (inches bgs)	pH (su)	Comments
HL-1	7/31/2017	0-8.5	5.63	Fescue and other grasses with good cover
		8.5-19	6.39	
		19-25	6.10	
HL-2	7/31/2017	0-14	1.91	Bare
		14-39	3.42	
		39-50	4.45	
HL-3	7/31/2017	0-3	3.13	Bare
		3-22.5	4.40	
		22.5-40	6.36	
		40-50	3.97	
HL-4	7/31/2017	0-4	2.84	Thin to no vegetation
		4-21	3.58	
		21-31	6.36	
		31-48	4.11	
HL-5	7/31/2017	0-4.5	5.99	Fescue and native grass with good cover
		4.5-22	6.03	
			5.87	
		0-12	5.72	
HL-6	7/31/2017	12-32	5.23	Good cover of fescue and natives
		32-43	5.93	
		0-5.5	2.64	
HL-7	7/31/2017	5.5-25	2.81	Bare
		25-46	5.90	
		0-5	3.04	
HL-8	7/31/2017	5-27	3.46	Bare
		27-40.5	3.90	
		0-7.5	5.69	
HL-9	7/31/2017	7.5-21.5	6.62	Mixed grasses good cover
		21.5-49	6.15	
		0-10	5.70	
HL-10	7/31/2017	10-31.5	2.31	Mixed grasses
		31.5-47	6.05	
		0-6	5.57	
HL-11	7/31/2017	6-13.5	6.46	Mixed grasses
		0-2	2.35	
HL-12	8/2/2017	2-18.5	2.00	Bare
		18.8-40	5.79	
		40-43.5	4.78	
		0-2	3.29	
HL-13	8/2/2017	2-8.5	5.78	Good fescue mix
		8.5-22	3.25	
		22-40	4.11	
		40-47	4.29	
		0-6	4.98	
HL-14	8/2/2017	6-25	4.65	Good fescue mix
		25-34.5	5.86	
		34.5-38	5.87	
		38-50	5.78	
		0-7	3.51	
HL-15	8/2/2017	7-27	3.91	Grass thin with bare areas forming
		27-45	5.33	

Table 3 (Continued)
Hessee and Lewis Property Soil pH Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample Location	Date	Sample Interval (inches bgs)	pH (su)	Comments
HL-16	8/2/2017	0-9	4.42	Fescue/Native Mix
		9-49	5.72	
HL-17	8/2/2017	0-6.5	4.64	Good grass cover with some bare spots
		6.5-9	3.70	
		9-29.5	5.01	
		29.5-39.5	5.53	
HL-18	8/2/2017	0-5	5.69	Fescue/legume mix, good cover
		5-41	6.17	
HL-19	8/2/2017	0-9.5	5.46	Fescue mix, sparse to good cover
HL-20	8/2/2017	0-5.5	4.77	Fescue/legume mix, good cover
		5.5-13	4.08	
		13-46.5	4.88	
		46.5-50	5.73	
HL-21	8/2/2017	0-7.5	5.90	Good grass cover
		7.5-49.5	5.55	
HL-22	8/2/2017	0-3.5	4.77	Fescue forbs natives legumes-good cover
		3.5-11	5.95	
		11-41.5	6.02	
HL-23	7/31/2017	0-4	4.87	Good mixed grasses
		4-13.5	4.70	
		13.5-27.5	5.12	
		27.5-51	4.03	
HL-24	8/2/2017	0-5.5	4.90	Fescue forbs natives legumes-good cover
		5.5-19	4.44	
		19-46	4.22	
HL-25	8/2/2017	0-4	4.57	Fescue native mix, good cover
		4-7.5	4.85	
		7.5-27.5	6.25	
		27.5-48	6.46	
HL-26	8/2/2017	0-9	5.00	Native grasses
		9-19.5	4.94	
		19.5-24	6.22	
		24-35	5.21	
		35-47.5	6.36	
HL-27	8/2/2017	0-3	5.12	Thin grasses-may have been road location
		3-8	5.44	
HL-28	8/2/2017	0-8	5.36	Natives and forbs
		8-48	4.50	
HL-29	8/2/2017	0-2	5.84	Good native cover
		2-17	5.39	
		17-32	4.18	
		32-34	5.60	
HL-30	8/2/2017	0-5	5.57	Native good cover
		5-16	6.05	
		16-25	6.29	
		25-49	6.55	

Table 3 (Continued)
Hessee and Lewis Property Soil pH Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample Location	Date	Sample Interval (inches bgs)	pH (su)	Comments
HL-31	8/2/2017	0-3	3.89	Natives and forbs
		3-24	6.15	
		24-32.5	6.00	
		32.5-34.5	6.00	
		34.5-43	5.57	
		43-49	5.36	
HL-32	8/8/2017	0-4	3.68	Sparse natives, drainage area, lots of iron
		4-24	4.37	
		24-50	5.52	
HL-33	8/8/2017	0-4	3.66	Sparse natives, drainage areas
		4-23	4.04	
		23-52	3.78	
HL-34	8/8/2017	0-4	3.62	Natives, moderate cover, hit a rock at 40" probe refusal
		4-16	3.58	
		16-19	NA	
		19-40	3.47	
HL-35	8/8/2017	0-6	4.14	Natives, good cover
		6-50	3.93	
HL-36	8/8/2017	0-10	3.68	Natives, good cover
		10-23	3.90	
		23-43	3.99	
HL-37	8/8/2017	0-6	3.59	Natives, moderate cover, First 3 probe attempts hit rocks and had probe refusal. This was the fourth attempt.
		6-23	3.96	
		23-45	4.05	
HL-38	8/8/2017	0-3	2.57	Bare
		3-12	2.37	
		12-28	5.92	
HL-39	8/8/2017	0-<1	NA	Bare
		1-12	2.38	
		12-31	5.63	
HL-40	8/8/2017	0-33	2.25	Bare
		33-50	2.33	
HL-41	3/5/2019	0-6	5.94	
		6-18	6.16	
HL-42	3/5/2019	0-6	6.25	
		6-18	6.05	
HL-43	3/5/2019	0-6	5.32	
		6-18	6.06	
HL-44	3/5/2019	0-6	4.83	Distressed vegetation
		6-18	4.47	
HL-45	3/5/2019	0-6	4.94	
		6-18	4.82	
HL-46	3/5/2019	0-6	4.73	Distressed vegetation
		6-18	4.71	
HL-47	3/5/2019	0-6	6.98	Distressed vegetation
		6-18	7.10	
HL-48	3/5/2019	0-6	4.82	Distressed vegetation
		6-18	4.75	
HL-49	3/5/2019	0-6	4.56	Distressed vegetation
		6-18	4.58	

Table 3 (Continued)
Hessee and Lewis Property Soil pH Results
OU3/OU4 Phase 2 Remedial Design
Cherokee County, Kansas

Sample Location	Date	Sample Interval (inches bgs)	pH (su)	Comments
HL-50	3/5/2019	0-6	4.75	Distressed vegetation
		6-18	4.49	
HL-51	3/5/2019	0-6	5.28	Distressed vegetation
		6-18	4.90	
HL-52	3/5/2019	0-6	4.98	Distressed vegetation
		6-18	4.45	
HL-53	3/5/2019	0-6	4.88	Distressed vegetation
		6-18	4.43	
HL-54	3/5/2019	0-6	5.04	
		6-18	5.37	
HL-55	3/5/2019	0-6	4.61	
		6-18	4.73	
HL-56	3/5/2019	0-6	4.61	Distressed vegetation
		6-18	4.50	
HL-57	3/5/2019	0-6	5.56	Distressed vegetation
		6-18	5.05	
HL-58	3/5/2019	0-6	5.81	
		6-18	5.67	
HL-59	3/5/2019	0-6	4.75	
		6-18	4.78	
HL-60	3/5/2019	0-6	4.90	
		6-18	4.47	
HL-61	3/5/2019	0-6	5.87	Distressed vegetation
		6-18	4.92	
HL-62	3/5/2019	0-6	5.31	Distressed vegetation
		6-18	4.91	
HL-63	3/5/2019	0-6	4.65	Distressed vegetation
		6-18	4.76	
HL-64	3/5/2019	0-6	4.59	Distressed vegetation
		6-18	4.75	
HL-65	3/5/2019	0-6	4.67	
		6-18	5.02	
HL-66	3/5/2019	0-6	6.28	Distressed vegetation
		6-18	6.20	
HL-67	3/5/2019	0-6	5.83	Distressed vegetation
		6-18	5.60	
HL-68	3/5/2019	0-6	6.54	
		6-18	6.32	
HL-69	3/5/2019	0-6	6.69	Distressed vegetation
		6-18	6.95	

Notes:

HL-1 through HL-40 were collected by Kansas Department of Health and Environment and comments are taken verbatim from the investigation report (KDHE, 2018).

HL-41 through 69 were collected by HydroGeoLogic, Inc.

bgs = below ground surface

su = standard unit

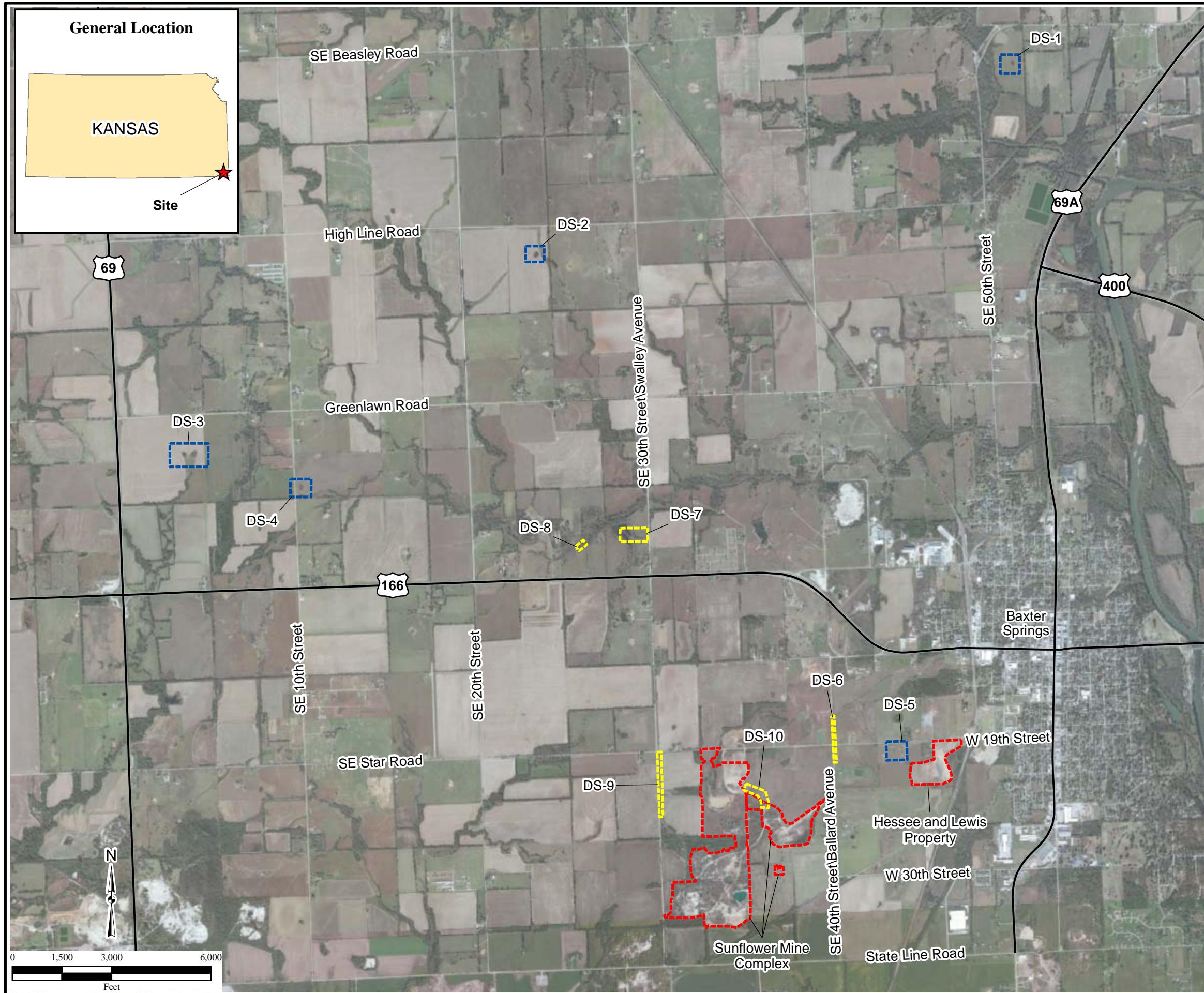
ATTACHMENT 2

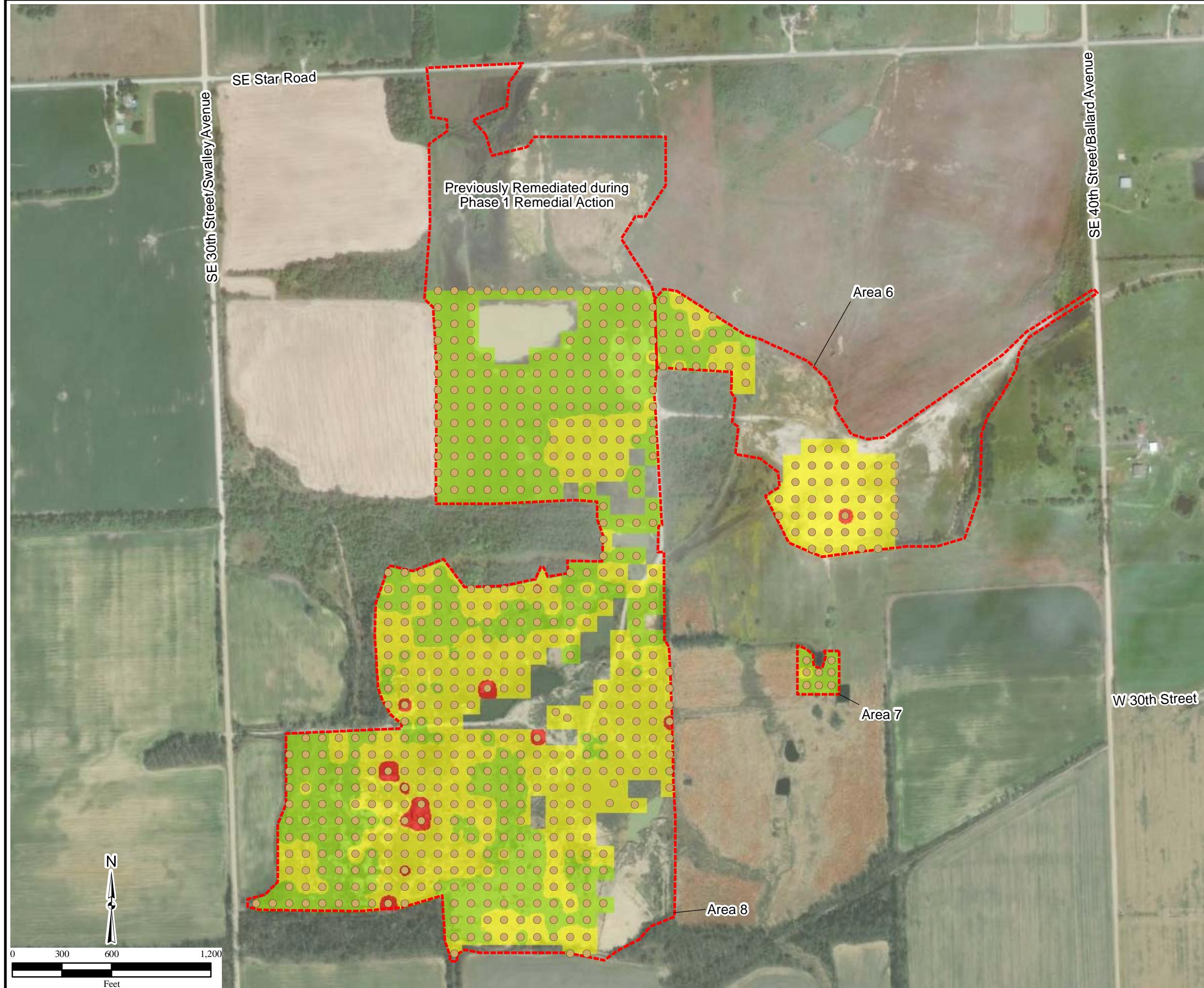
FIGURES

- Figure 1 Site Location Map
- Figure 2 Sunflower Mine Complex Cadmium Sampling Results December 2018
- Figure 3 Sunflower Mine Complex Lead Sampling Results December 2018
- Figure 4 Sunflower Mine Complex Zinc Sampling Results December 2018
- Figure 5 DS-6 Test Pit Sampling Results
- Figure 6 DS-7 and DS-8 Test Pit Sampling Results
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- Figure 8 Hessee and Lewis Property Soil pH Results – 0 to 6 inches bgs
- Figure 9 Hessee and Lewis Property Soil pH Results – 6 to 18 inches bgs

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Figure 1
Site Location Map





\Gst-srv-01\HGLGIS\Baxter_Springs_EP9039_MSIW\Phase2_RDFI\
(02)\Sunflower_Samples_Cadmium_Results.mxd
5/2/2019 JG
Source: HGL, KSDHE
ArcGIS Online Imagery



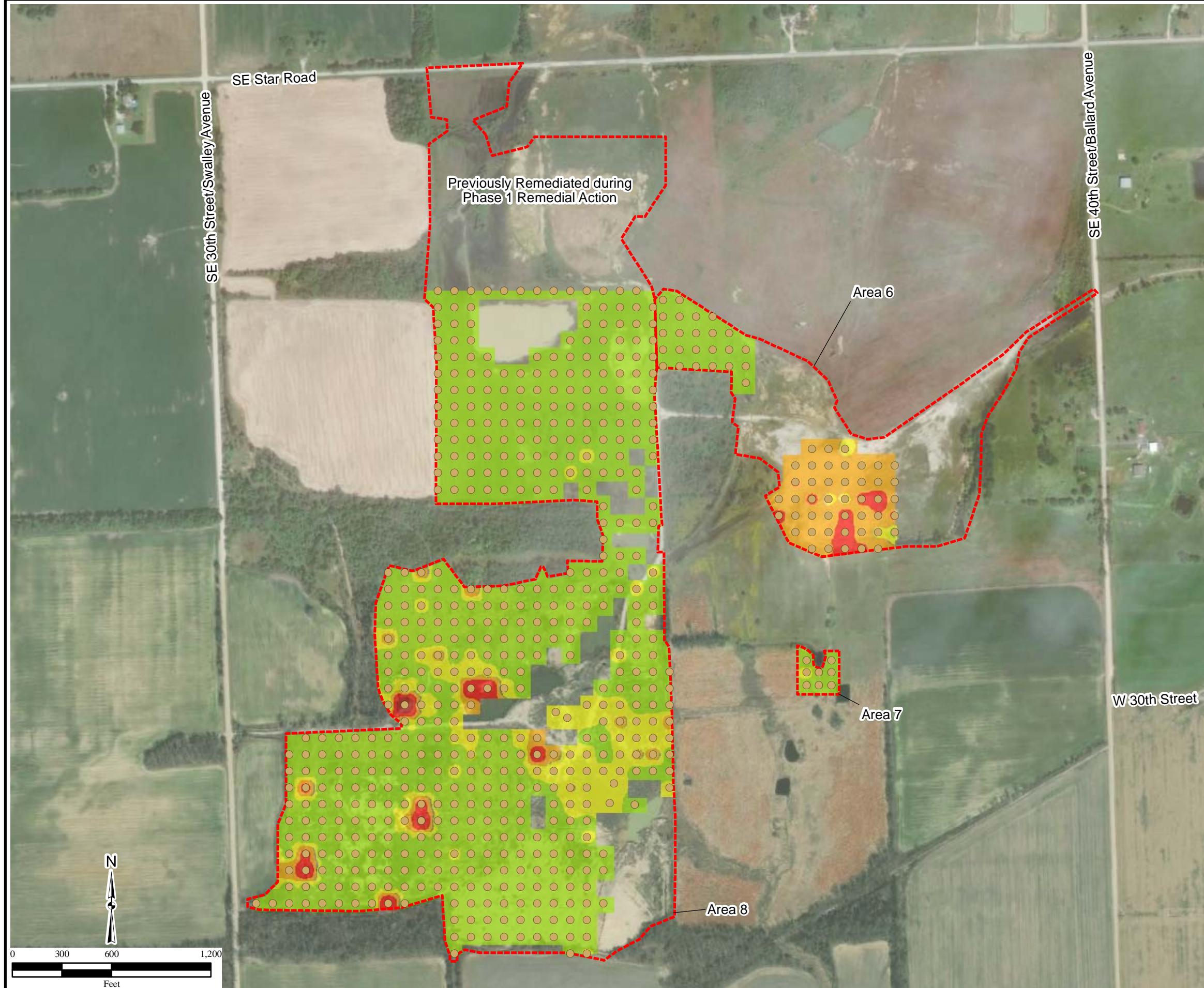


Figure 3
Sunflower Mine Complex
Lead Sampling Results
December 2018

Legend

● Surface Soil Sample

Lead Concentration (mg/kg):

< 400
401–999
1,000–2,000
2,000–4,999
>5,000

□ Approximate Study Area

Notes:
Remedial Action Objective (RAO) in Soil for Lead: 400 mg/kg

mg/kg=milligrams per kilogram
OU=operable unit
RD=remedial design

\Gst-srv-01\HGLGIS\Baxter_Springs_EP9039\MSIW\Phase2_RDFI\
(03)Sunflower_Samples_Lead_Results.mxd
5/2/2019 JG
Source: HGL, KSDHE
ArcGIS Online Imagery



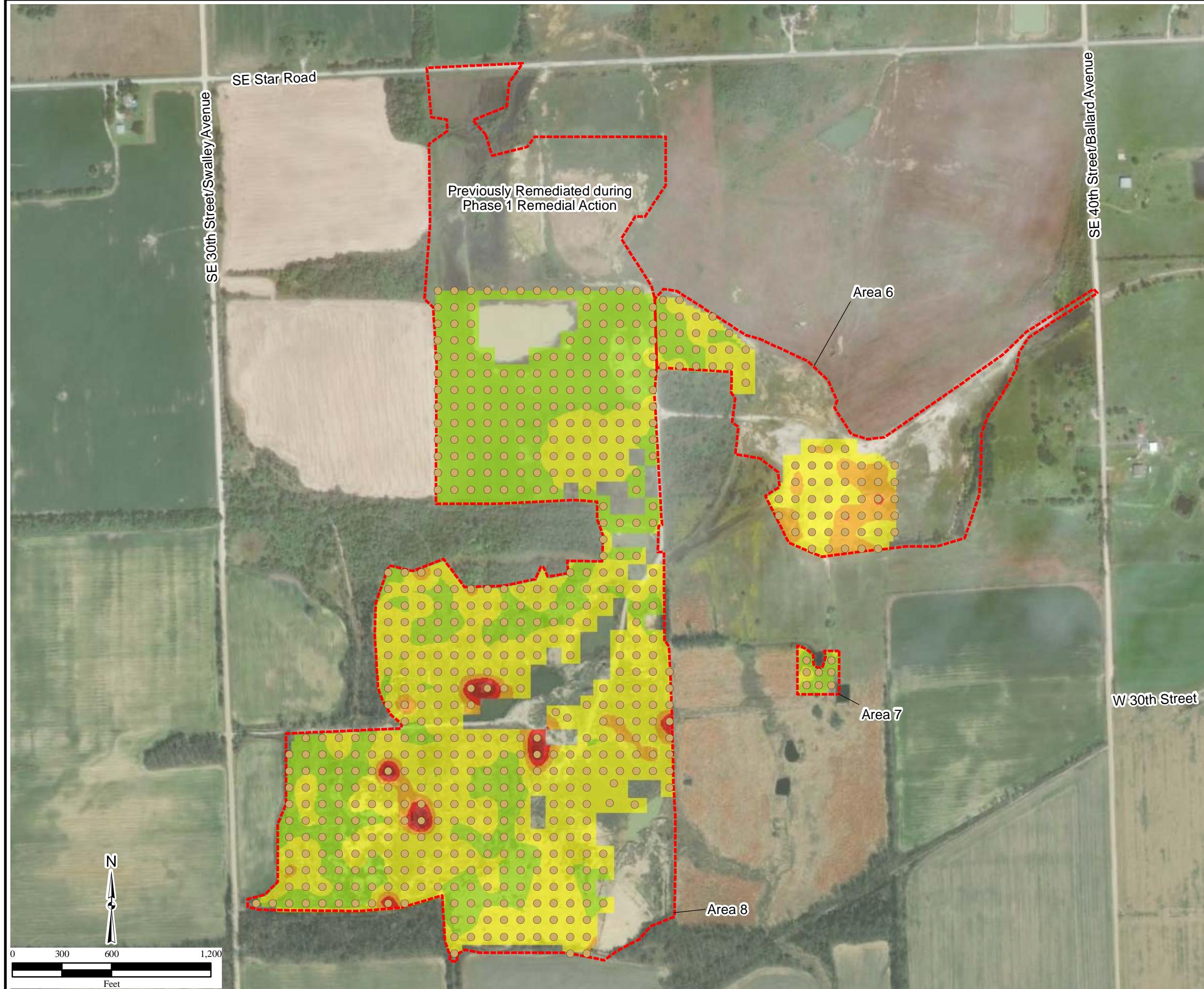


Figure 4
Sunflower Mine Complex
Zinc Sampling Results
December 2018

Legend

● Surface Soil Sample

Zinc Concentration (mg/kg):

< 1,076
1,076–9,999
10,000–19,999
20,000–29,999
>30,000

□ Approximate Study Area

Notes:

Remedial Action Objective (RAO) in Soil for Zinc: 1,076 mg/kg

mg/kg=milligrams per kilogram

OU=operable unit

RD=remedial design

\Gst-srv-01\HGLGIS\Baxter_Springs_EP9039_MSIW\Phase2_RDFI\
(04)Sunflower_Samples_Zinc_results.mxd
5/2/2019 TB
Source: HGL, KSDHE
ArcGIS Online Imagery



Figure 5 DS-6 Test Pit Sampling Results

Legend

● Test Pit Sample

□ Distal Site—Investigated

Metal	RAO (mg/kg)
Cadmium	10
Lead	400
Zinc	1,076

Notes:

Bolded results indicate a detection.

Shaded results indicate the concentration is greater than the RAO.

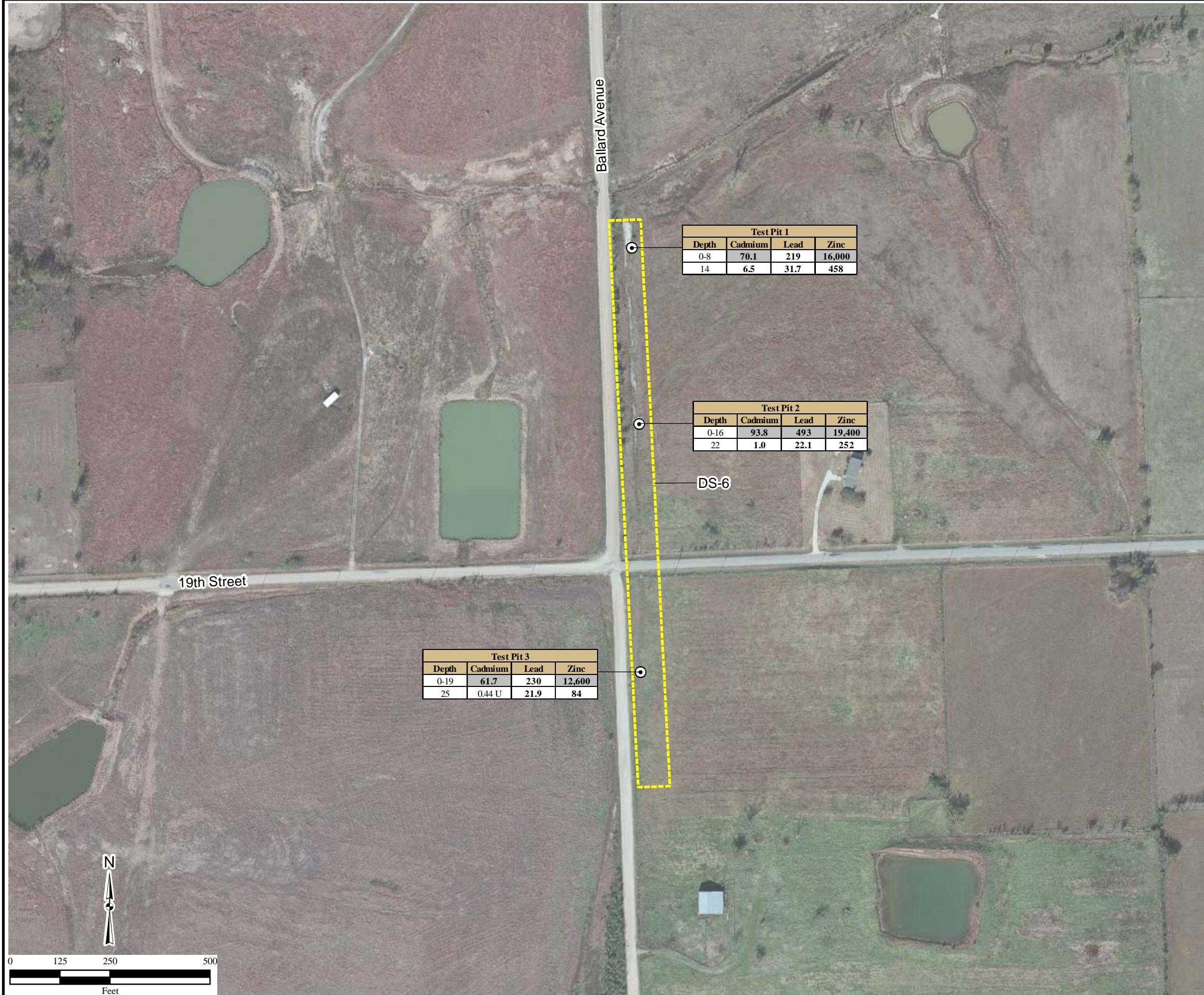
All concentrations are in milligrams per kilogram (mg/kg).
Test Pit sample depth measured in inches below ground surface.
In the case of duplicates, the highest concentration is shown.

OU=operable unit

RAO=remedial action objective

RD=remedial design

U=not detected at the listed method reporting limit



\Gst-srv-01\HGLGIS\Baxter_Springs_EP9039_MSIW\Phase2_RDFI\
(05)DS-6_Sample_Results.mxd
5/8/2019 JG
Source: HGL, KSDHE
ArcGIS Online Imagery (Clarity)



Figure 6
DS-7 and DS-8
Test Pit Sampling Results

Legend

● Test Pit Sample

□ Distal Site—Investigated

Metal	RAO (mg/kg)
Cadmium	10
Lead	400
Zinc	1,076

Notes:

Bolded results indicate a detection.

Shaded results indicate the concentration is greater than the RAO.

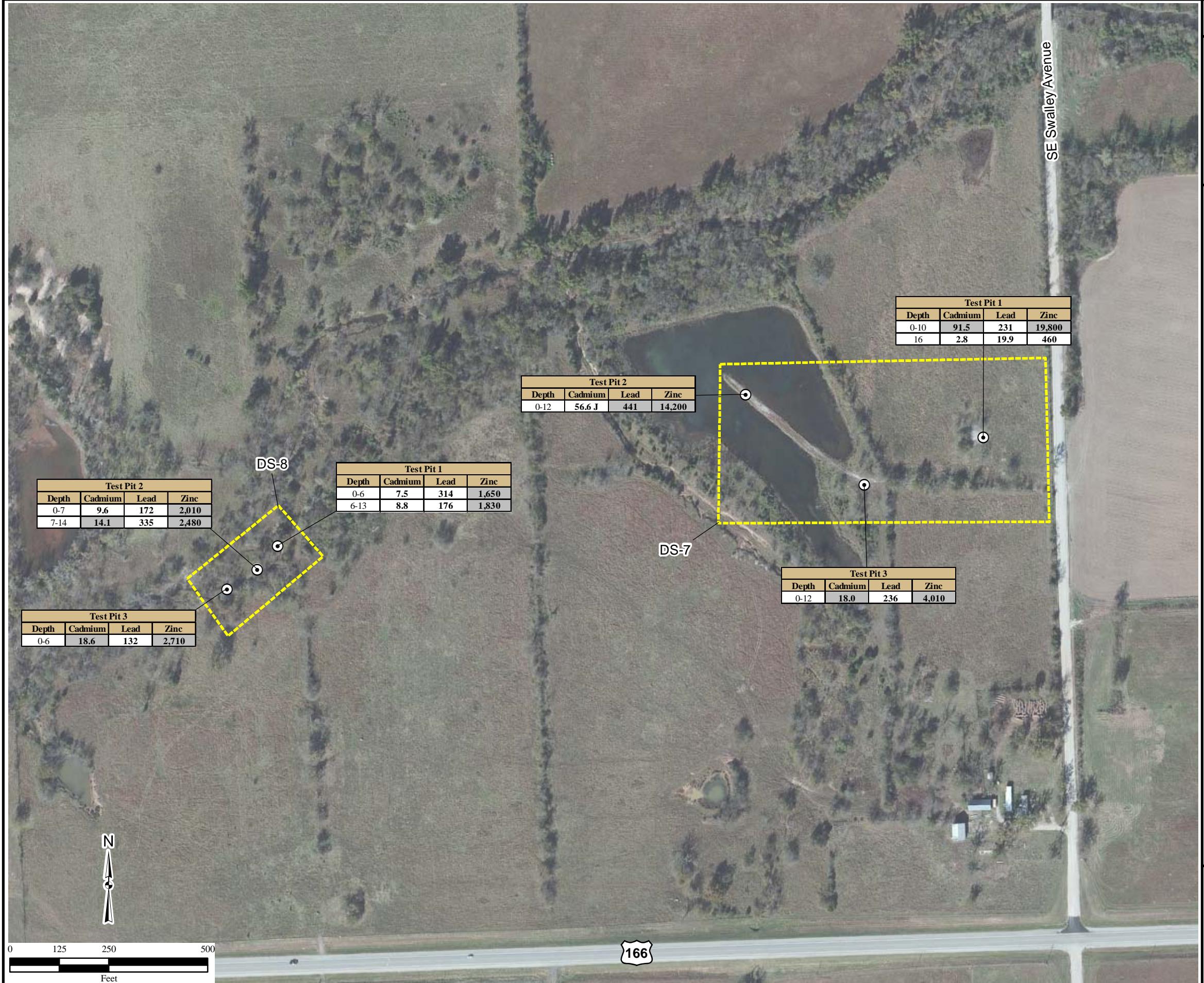
All concentrations are in milligrams per kilogram (mg/kg).
Test Pit sample depth measured in inches below ground surface.
In the case of duplicates, the highest concentration is shown.

J=estimated

OU=operable unit

RAO=remedial action objective

RD=remedial design



\Gst-srv-01\HGLGIS\Baxter_Springs_EP9039_MSIW\Phase2_RDFI\
(06)DS-7-8_Sample_Results.mxd
5/8/2019 JG
Source: HGL, KSDHE
ArcGIS Online Imagery (Clarity)



Figure 7
DS-9 and DS-10
Test Pit Sampling Results

Legend

● Test Pit Sample

■ Distal Site—Investigated

□ Approximate Study Area

Metal	RAO (mg/kg)
Cadmium	10
Lead	400
Zinc	1,076

Notes:

Bolded results indicate a detection.

Shaded results indicate the concentration is greater than the RAO.

All concentrations are in milligrams per kilogram (mg/kg).
Test Pit sample depth measured in inches below ground surface.
In the case of duplicates, the highest concentration is shown.

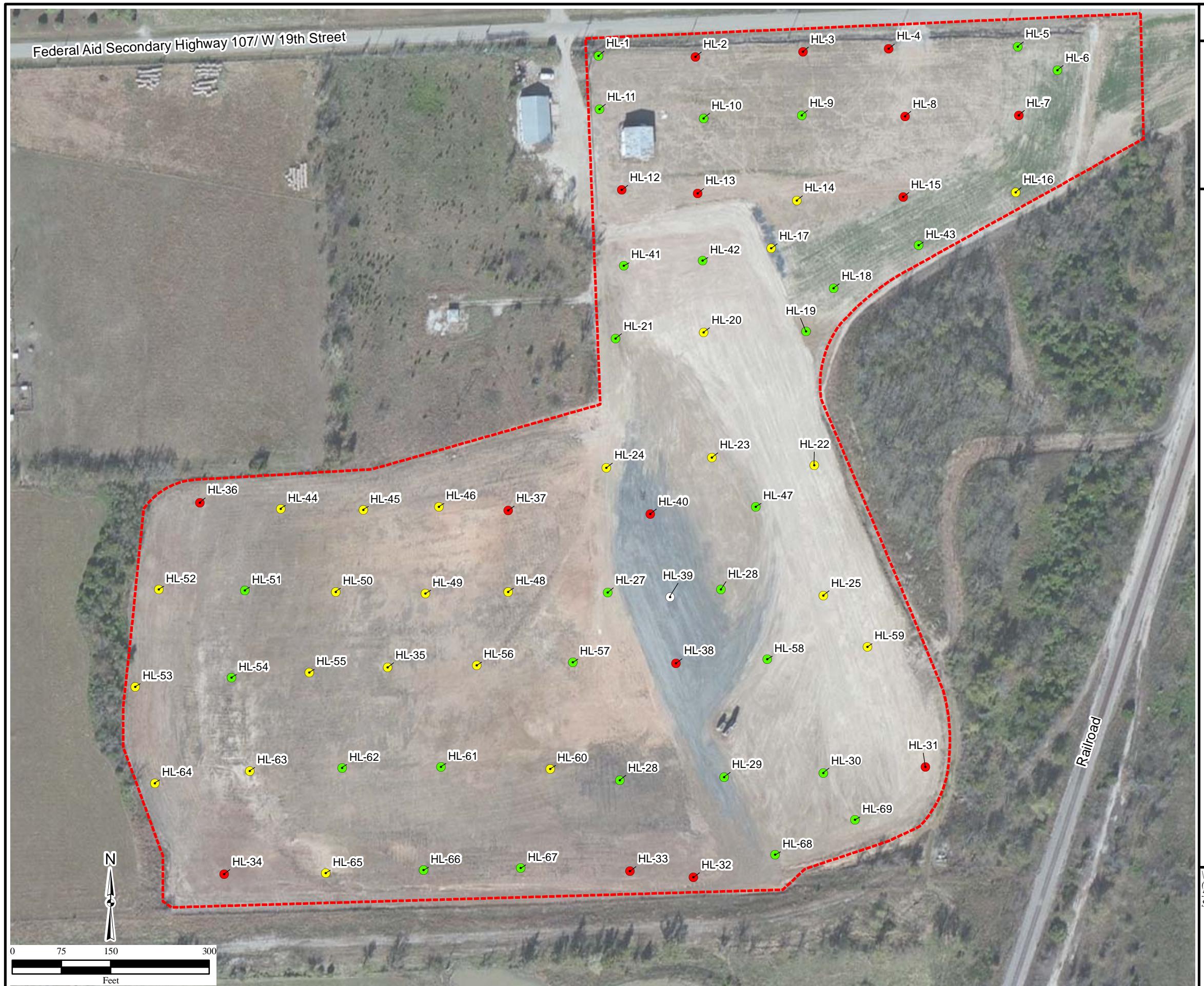
J=estimated

OU=operable unit

RAO=remedial action objective

RD=remedial design





HGL—Supplemental Phase 2 RD Field Investigation
 Cherokee County Superfund Site, OU3 and OU4, KS

Figure 8
Hessee and Lewis Property
Soil pH Results
0–6 inches bgs

Legend

Probe Sample Results:

- Not Collected
- pH 5.00 to 7.00
- pH 4.00 to 4.99
- pH 1.00 to 3.99

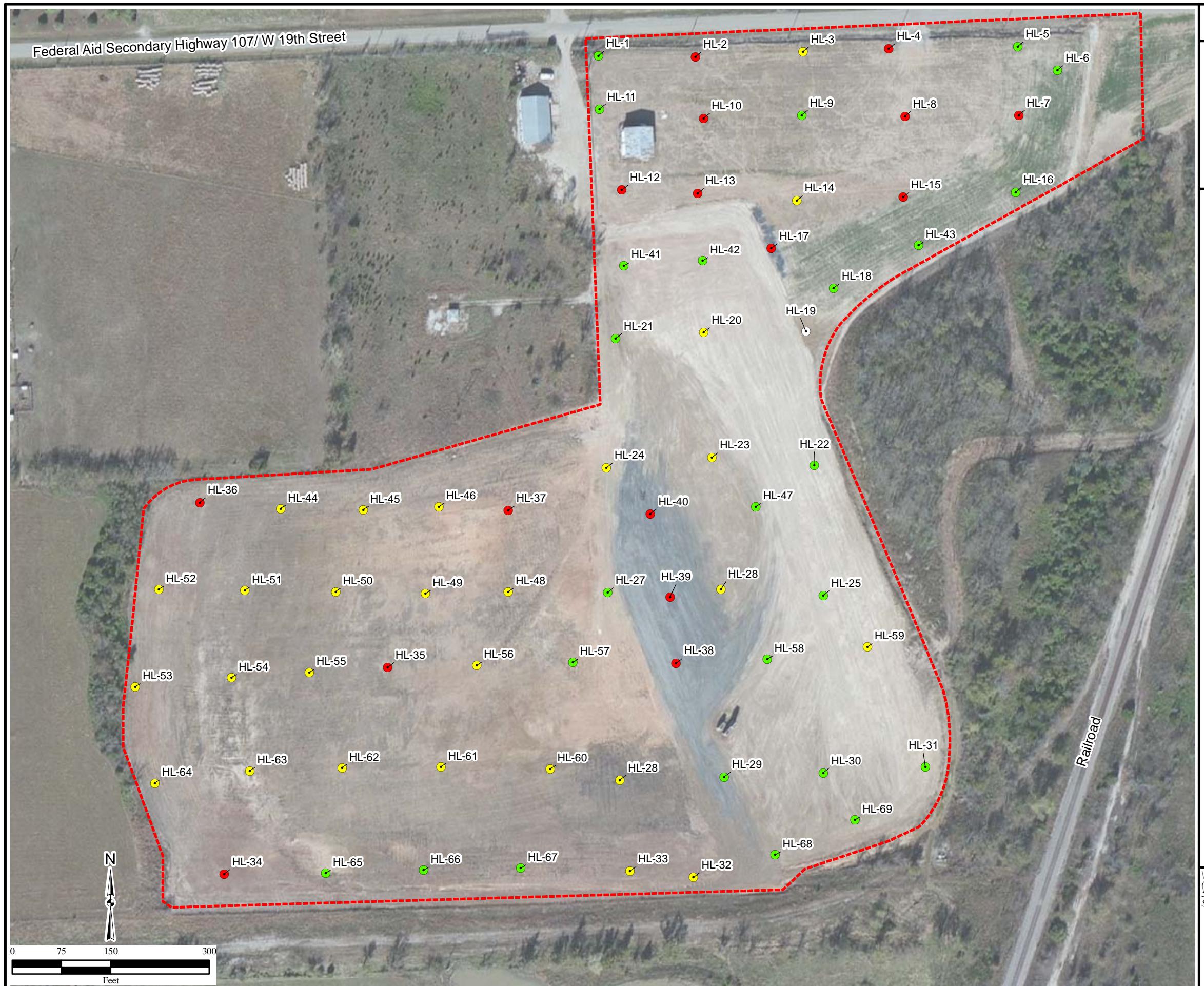
Approximate Study Area

Notes:
 Sample depths vary by location.
 Samples HL-41 through HL-69 were collected by HGL.
 Samples HL-1 through HL-40 were collected by KDHE in 2017.
 KDHE samples shown on this figure had an average depth of 3.1 inches bgs.

bgs=below ground surface
 KDHE=Kansas Department of Health and Environment
 OU=operable unit
 RD=remedial design

\Gst-srv-01\HGLGIS\Baxter_Springs_EP9039_MSIW\Phase2_RDFI\
 (08)Hessee-Lewis_pH_0-6.mxd
 5/7/2019 JG
 Source: HGL, KSDHE
 ArcGIS Online Imagery (Clarity)





HGL—Supplemental Phase 2 RD Field Investigation
 Cherokee County Superfund Site, OU3 and OU4, KS

Figure 9
Hessee and Lewis Property
Soil pH Results
6–18 inches bgs

Legend

Probe Sample Results:

- Not Collected
- pH 5.00 to 7.00
- pH 4.00 to 4.99
- pH 1.00 to 3.99

Approximate Study Area

Notes:
 Sample depths vary by location.
 Samples HL-41 through HL-69 were collected by HGL.
 Samples HL-1 through HL-40 were collected by KDHE in 2017.
 KDHE samples shown on this figure had an average depth of 13.6 inches bgs.

bgs=below ground surface
 KDHE=Kansas Department of Health and Environment
 OU=operable unit
 RD=remedial design

\Gst-srv-01\HGLGIS\Baxter_Springs_EP9039_MSIW\Phase2_RDFI\
 (09)Hessee-Lewis_pH_6-18.mxd
 5/7/2019 JG
 Source: HGL, KSDHE
 ArcGIS Online Imagery (Clarity)



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ATTACHMENT 3
FIELD DOCUMENTATION
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ATTACHMENT 4

ANALYTICAL DATA

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